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New type 1 A-2, 400-H.P. steam rail cars for the Turkish State Railways,

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Introduction.

In 1932 three steam rail cars intended for working lines with little traffic (light trains) of the Turkish Railways and Harbours at Ankara were tested and put into service.

These rail cars have a number of new and interesting features which the author of this article, who was present at several of the trial and inspection runs, describes below with his observations.

The rail cars numbered 1, 2 and 3 were built by the Maschinenfabrik Esslingen near Stuttgart, and the first trials were carried out on the 200-km. (124 miles) Stuttgart-Ulm-Friedrichshafen section of the German National Railways and then on the Haydar-Pacha to Pendik (50 km. = 31 miles) and Haydar-Pacha to Diliskelesi (110 km. = 63.3 miles) lines in Asia Minor.

* * *

The 400-H.P. rail cars consist of a motor unit — a small superheated steam locomotive, 25 atm. (355 lb. per sq. inch) boiler pressure with poppet valve gear — of the 1A type, and a carriage of the ABCD type, that is with 1st, 2nd and 3rd class compartments and luggage compartment; this carriage is carried at the leading end on a spherical centre over the driving axle and on side bearings on the back end of the motor unit; the trailing end of the body, that is of the rail car, is carried on a 4-wheeled carriage bogie. We have therefore an articulated motor vehicle shown in figures 1, 2 and 3, partly also in figures 4 and 5.

The carriage part which we will describe later on has no particularly unusual features and its construction, also in cross section, is clearly shown in figures 1 and 2. The three passenger compartments (1) have seating accommodation for 56 passengers; there are entrance doors at the centre and ends, a lavatory, and in the luggage compartment the necessary equipment to meet the post office requirements. The car is provided with electric ventilators and is lighted by electricity.

(1) The provision of three classes in a single rail car may be criticised on the grounds of cost and possible changes in operating conditions : but it must be remembered that, in the East, class distinction plays a greater part than in Europe.

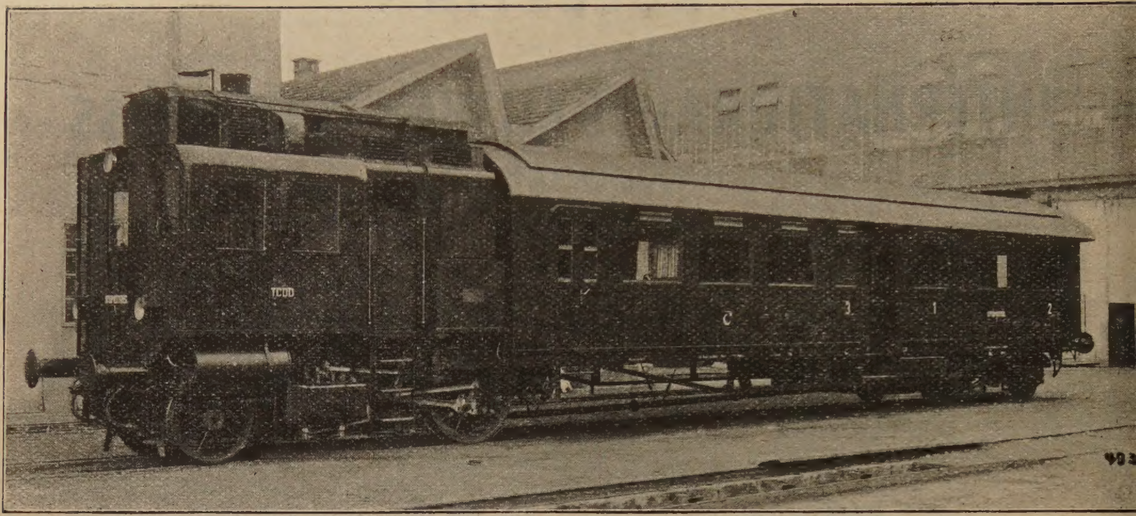


Fig. 1. — New 400-H.P., type 1A-2, steam rail car (Nos. 1, 2 and 3) of the Turkish Railways.

The leading dimensions of these rail cars are as follows :

Diameter of cylinders	250 mm. (*9 27/32 in.*).
Stroke	500 mm. (*19 11/16 in.*).
Boiler pressure.	25 kgr./cm² (*355 lb. per sq. in.*).
Boiler heating surface	14.7 m² (*158.2 sq. ft.*).
Preheater surface.	22.3 m² (*240.0 sq. ft.*).
Exhaust steam preheater surface . . .	3.9 m² (*42.0 sq. ft.*).
Superheater surface	10.1 m² (*108.7 sq. ft.*).
Grate area	1.0 m² (*10.7 sq. ft.*).
Coal	0.8 t. (*1 760 lb.*).
Water	3.2 t. (*7 050 lb.*).
Mean tractive effort at the tread (2) . .	1 400 kgr. (*3 086 lb.*).
Maximum tractive effort at the tread (2).	3 630 kgr. (*8 000 lb.*).
Maximum driving axle load	17 t. (*16.7 Engl. tons*).
Maximum carrying axle load.	16 t. (*15.7 Engl. tons*).
Maximum load on carrying bogie, in t.	2 × 12.5 = 25 t. (*24.6 Engl. tons*).
Tare weight of rail car	49 t. (*48.2 Engl. tons*).
Weight in full working order	58 t. (57.1 *Engl. tons*).
Diameter of driving wheels	1.400 m. (*4 ft. 7 1/8 in.*).
Diameter of carrying wheels.	1.000 m. (*3 ft. 3 3/8 in.*).
Wheel base, motor unit	3.600 m. (*11 ft. 9 3/4 in.*).
Wheel base, carrying bogie	3.000 m. (*9 ft. 10 1/8 in.*).
Total wheel base	17.370 m. (*57 feet*).
Maximum working speed, per hour . .	75 km. (*46.6 miles*).

([2] Calculated by the formula 0.25 × resp. 0.65 × $\frac{25\times25^2\times50}{140}$.

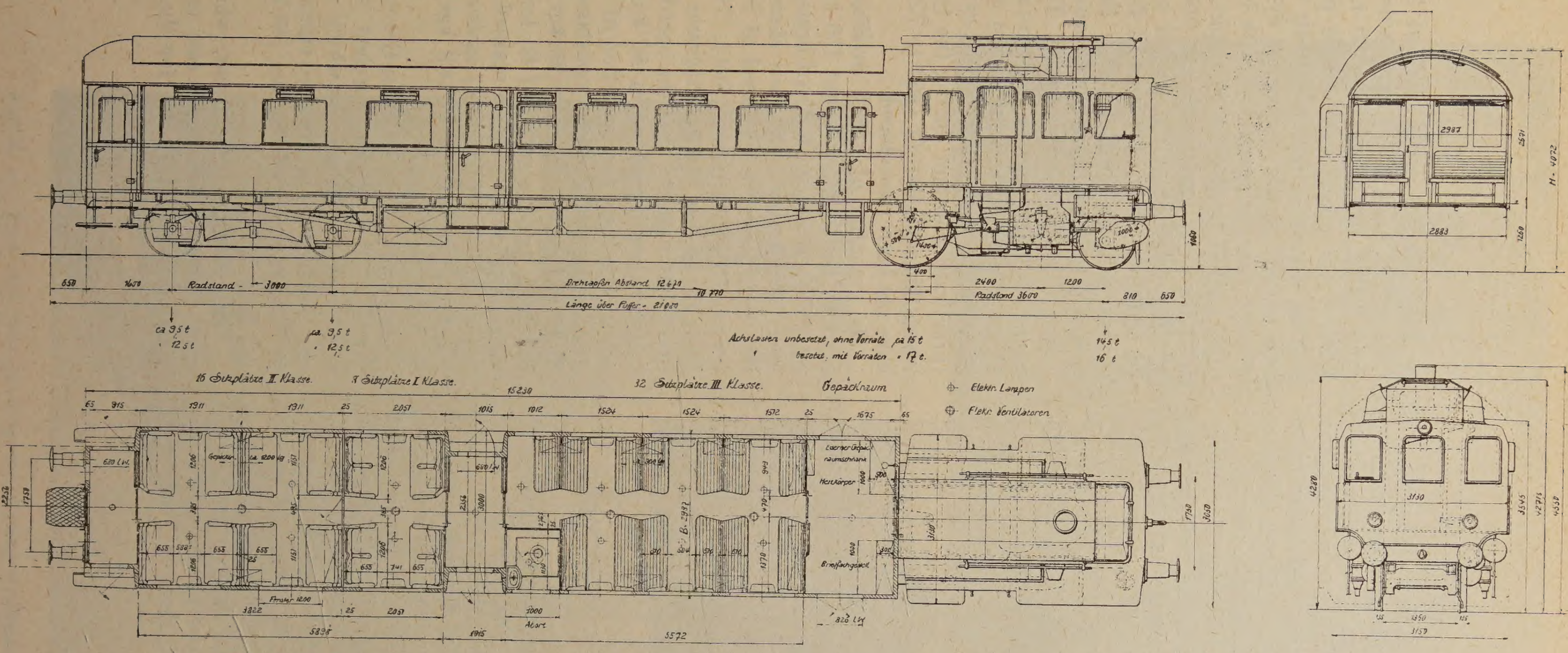


Fig. 2. — Elevation, plan, cross section and end view of the rail car.

Explanation of German terms :

Radstand = Wheel base. — Drehzapfen Abstand = Distance of pivots. — Länge über Puffer = Length overall. — Achslasten... = Axle charges unloaded 15 tons; in working order and loaded 17 tons. — Sitzplätze = Seats. — Fenster = Window. — Gepäckraum = Luggage compartment.

Up to the present time, the power of steam rail cars has rarely exceeded 200 H. P., and their use was consequently limited. They could not be used on lines on which the frequency of trains exceeded a certain figure nor in cases when one or several trailers had to be attached for operating reasons. The greater power, 400 H. P. and over, of the new desing — a power mainly possible as a result of

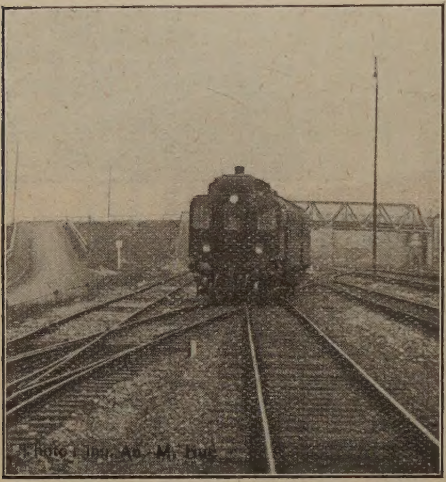


Fig. 3. — Rail car of figures 1 and 2, working in Obertürkheim station.

using the steam pressure of 25 atm. (355 lb. per sq. inch), superheated to 400° C. (752° F.) in conjunction with the relatively low weight of the rail car (which forms in fact a complete and independent steam train) — allows of greater elasticity in the working and makes it possible to consider the rail car as regards traction as a small locomotive which can, if need be, deal with any small supplementary load attached.

The specification laid down that, in order to meet the operating conditions on the lines on which these rail cars would be used, the car must haul, at 75 km. (46.6 miles) and over, up gradients of 1 in 200 a coach weighing 20 t. (19.7 Engl. tons) empty; the single pair of driving wheels — driven directly by the two outside single expansion cylinders through connecting rods — with its load of 17 t. (16.7 Engl. tons) is ample to deal with the fully loaded rail car under all starting conditions (see figs. 4 and 5). In addition, if the diagrams of figure 7 are examined, it will be seen that the power of these rail cars can be quite well raised to 480 H. P. temporarily. The diagrams of the smoke box vacuum (average 20 mm. = 25/32 inch of water) and the temperature of the steam in the cylinders [practically constant during the tests between 350 and 400° C. (662 to 752° F.)] have not been reproduced.

The quantity of steam produced per hour by the boiler is about 136 kgr. per m² (27.35 lb. per sq. foot) of heating surface. Stationary tests have shown that this figure can be increased to 200 kgr. per m² (40.96 lb. per sq. foot). The tests have also shown, as the diagrams of figure 7 (D) indicate, that the speed of the rail car has been kept at 60 km. (37.3 miles) per hour over a section of 5.7 km. (3.54 miles) with a total resistance (gradient and curve) of about 25 kgr./t. (56 lb./Engl. ton): a speed of 80 km. (49.7 miles) per hour was maintained over a run of 6.8 km. (4.23 miles) against à gradient and resistance of 14.3 kgr./t. (32 lb./Engl. ton).

During the tests made in Germany the speed of the rail car reached 108 km. (67.1 miles) per hour, at which speed it ran perfectly: in reverse running the maximum speed was 80 km. (49.7 miles) per hour.

The behaviour of the car, when running, was good and this is easy to understand seeing that, except for the articu-

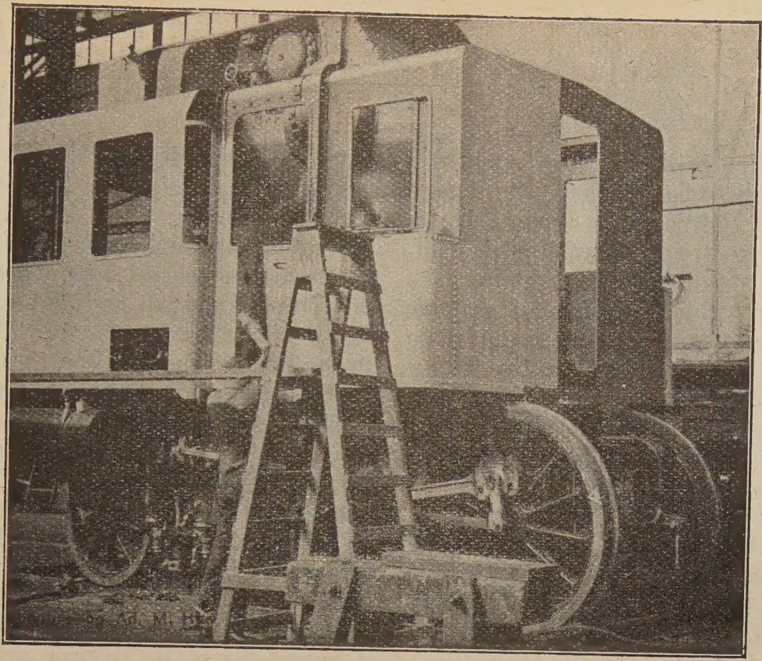


Fig. 4. — Motor unit during erection in the Esslingen Works.

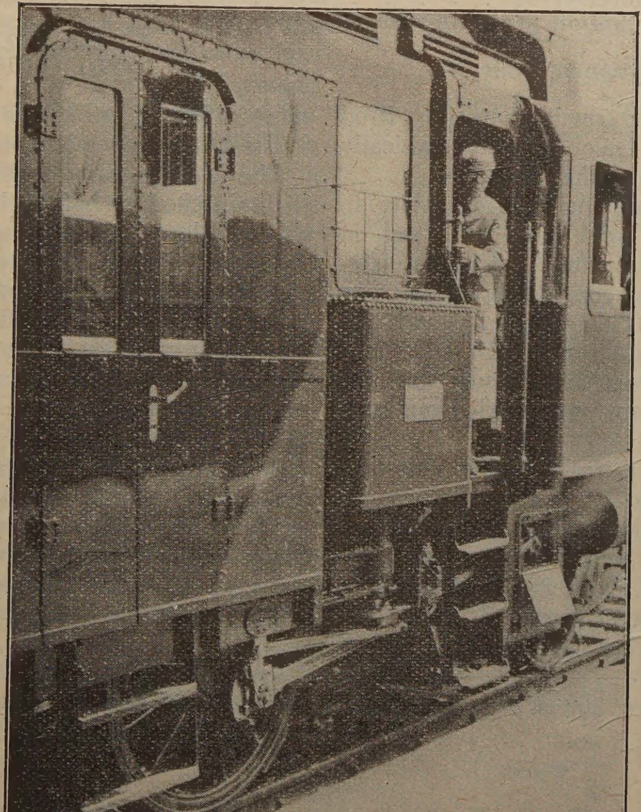


Fig. 5. — Part side view showing the driving mechanism and the body side bearings (valve cover open).

lation, we are dealing with a large bogie carriage with relatively long wheel base bogies; in addition the vertical boiler raises the centre of gravity which increases the steadiness when running. The articulation, which consists of a large spherical pivot without play, has given no trouble in running; this centre, as we have already pointed out, is placed over the driving axle. The side bearings too are very substantial and have a relatively large surface (see fig. 5).

The water and coal consumption figures, officially measured during the inspection tests on the 4 May 1932, with No. 1 rail car on the Stuttgart-Obertürkheim [3]-Ulm-Friedrichshafen line (see gradient section fig. 6, and diagram F of gradient-curve resistance, fig. 7) were respectively — water: 4 650 kgr. (10 250 lb.) on the outward and 3 800 kgr. (8 375 lb.) on the return run, and coal: 700 kgr. (1 543 lb.) on the outward and 590 kgr. (1 301 lb.) on the return run. The figures for the return journey include heating during the stop at the terminal station.

The tests carried out in Asia Minor in August 1932 on the Haydar-Pacha to Diliskelesi line (110 km. = 68.35 miles, with a 1 in 66 gradient for 10 km. = 6.2 miles) give the following results for an average total weight of train of 130 t. (127.9 Engl. tons) [with two trailers of 40 t. (39.4 Engl. tons)] [4].

Coal used for lighting up.	122 kgr. (*225 lb.*).
Coal used over the Haydar-Pacha-Diliskelisi section and back (including two stops of 50 and 35 minutes respectively)	628 kgr. (*1 384 lb.*)
Average consumption per train-kilometre (per train-mile)	5.7 kgr. (*20.2 lb.*).
Total consumption of water	4 800 l. (*1 055 Br. gallons*).

Except for 30 small shovelfuls fired by hand, the boiler was automatically stoked throughout the trials.

These consumption figures relate to the theoretical work done when out on the line, the total work, that is the effective work, being considerably greater, as the fuel used by the auxiliaries is included in it; the grate was built to use the average coal used in Anatolia and the tests in Germany were carried out with Ruhr coal.

These rail cars are driven by one man (that is a total of two men when the guard is included) and the above figures show that the saving of water and coal by the cars is about 25 % relatively to the older smaller powered units. The higher power has also shown itself as more efficient, unlike the smaller units.

The method of operation is as follows:

The steam is raised to 200° C. (392° F.) in the preheater; before the water passes through the evaporators the scale forming salts that may be contained in it are removed, so that the part of the boiler exposed to the fire only receives pure water.

The air and gases contained in this water are at the same time removed, as is any suspended matter. The combustion air is also preheated. The boiler is fed by a variable feed pump driven off the leading pair of carrying wheels : the grate is fired semi-automatically. The water and coal carried are sufficient for runs of 100 and 200 km. (62 and 124 miles) respectively. Figures 8 and 9 show

(3) The nearest station to the Esslingen Works.

(4) According to the report made by the Locomotive Department of the Turkish Railways, at Haydar-Pacha.

the driver's compartment and the left hand passage in the locomotive part of the car.

Undoubtedly this type of rail car, which weighs with its average load about 53 to 55 t. (52.2 to 54.1 Engl. tons) is an interesting example of a light train for lines over which, for certain reasons, steam cars are more suitable than any other form of traction. These rail cars are generally not comparable from the point of view of weight with the lighter Diesel-engined rail cars with mechanical drive, for example, but it must not be forgotten they must carry with them supplies of water and coal which are heavier than the supplies needed for internal combustion motors. It is impossible to make any general and definite pronouncement on this method of working : there are and undoubtedly always will be regions where steam rail cars will be the desired and best solution for use as light trains, in view of the local conditions and the operating methods of the railway systems. This for example is the case with part of the lines in Asia Minor. Steam traction even with rail cars is only justified, however, when coal and water are available at the principal supply points and in particular good water (so that the cost of boiler repairs may not be excessive) must be easily obtainable. In countries in which suitable water is wanting and where coal is scarce or dear, oil motive power with Diesel engines will generally be better.

The advantages of the rail cars described above are, from the point of steam traction in general or vis-à-vis heavier units, the following :

— Prepared for service relatively quickly;

— The feed water can be softened and be heated gradually more easily than with a more powerful steam locomotive;

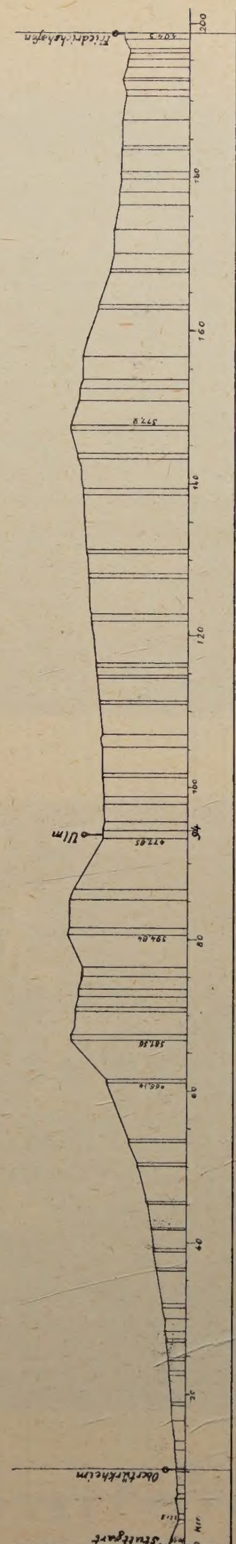


Fig. 6. — The Stuttgart-Ulm-Friedrichshafen line, showing gradients.

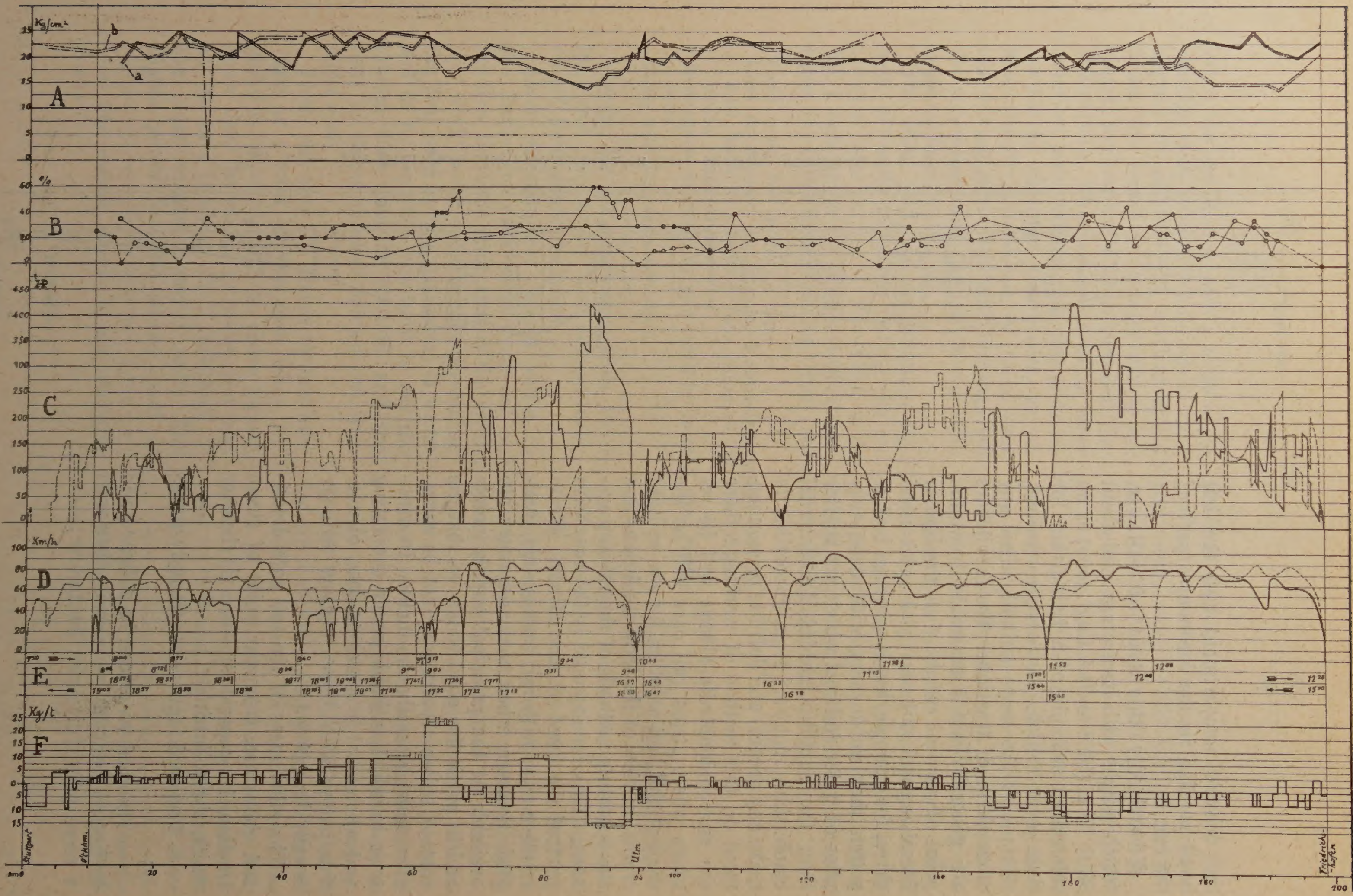
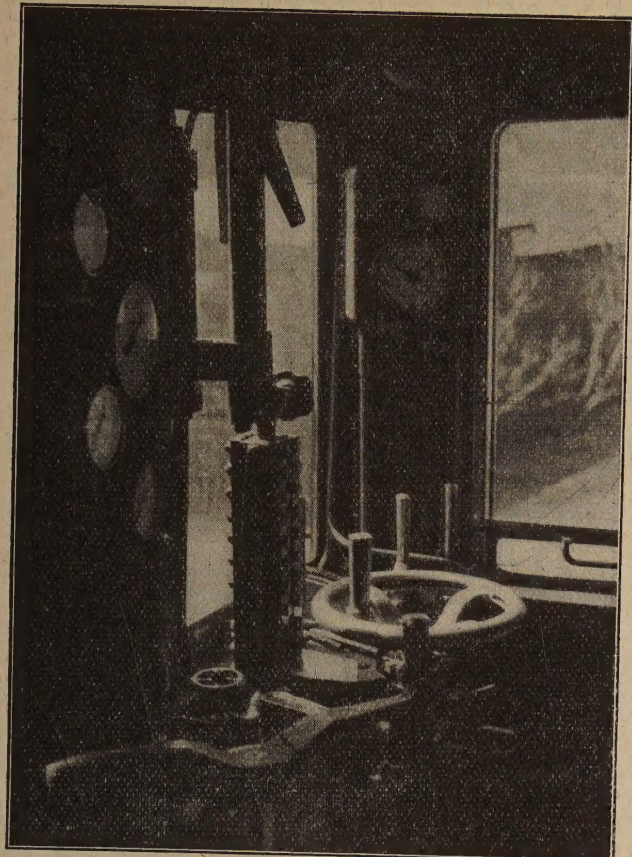
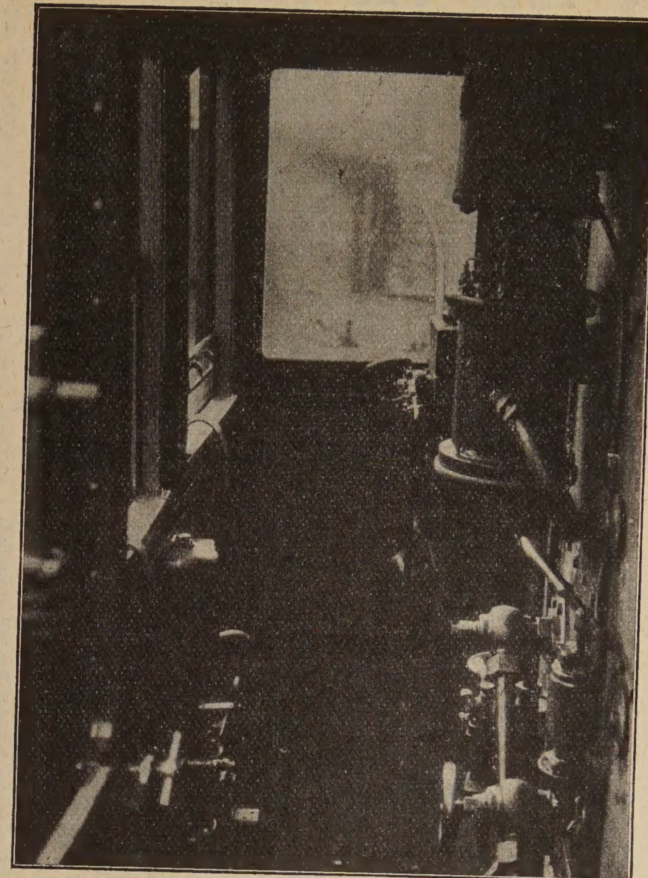


Fig. 7. — Diagrams showing : *A*) Steam pressure in the boiler (*a*) and in the cylinders (*b*), in kgr./cm²; *B*) Cut off, %; *C*) Horsepower developed; *D*) Speeds in km./h.; *E*) Timings; *F*) Gradient and curve resistance of a trial run Stuttgart-Ulm-Friedrichshafen (dotted lines) and return (Friedrichshafen-Ulm-Obertürkheim (full lines). See also figure 6.





Photos : A. Hug.

Figs. 8 and 9. — Driver's compartment taken from the front left hand corner of the engine (to the left), and from the left hand gangway, from the trailing towards the front end.

— The poppet valve gear allows the cut-off to be set very accurately, between 4 and 74 %, which improves the efficiency appreciably.

— One man works the rail car and this is possible owing to the simplicity and convenient grouping of the controls (see fig. 8) and to the automatic stoking.

— The low vacuum in the smoke box lessens, thanks to the particular form of construction of the boiler, the risk of the emission of sparks from the chimney and without any necessity for providing a special form of spark arrester.

— Owing to the use of superheated steam, the exhaust is almost invisible.

— The power is relatively high for a fairly low weight and the consumption of coal, water and oil is also lower when considered proportionally to that of steam locomotives.

To sum up, it may be said that the trial runs with these rail cars were very interesting and were carried out to the full satisfaction of everyone concerned.

These vehicles undoubtedly form one of the most interesting of the types of modern steam vehicles actually in service in the different countries of the World.

[621 .45]

The Diesel motor applied to railway traction,

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(*Le Génie Civil.*)

The idea of using the Diesel motor for railway traction dates from the beginning of the present century : the first machines were the Sulzer locomotives of 1912 and 1914. Designs and applications of the injection motor in this particular field have only been actively developed during the last ten years.

The problem to be solved is in fact a difficult one : the loading gauge and the maximum axle load impose rather restrictive limits : as the time table must be worked to, the motor must be completely reliable; another great drawback is that the Diesel engine cannot start by itself. Furthermore, the power curve of the Diesel engine is not nearly so good as that of the steam engine : this necessitates the use of suitable methods to make the power curve of the Diesel locomotive follow as closely as possible that of the steam locomotive. Most of the solutions adopted up to the present have at the same time solved the starting difficulty: at the present time nearly all Diesel locomotives employ electrical, mechanical, pneumatic, or hydraulic transmission gear.

In addition another serious difficulty is that of the cooling of the motor. The number of calories to be got rid of by the cooling water is in the case of the Diesel motor about one third of the heat units introduced into the cylinder with the fuel. In the case of a motor of 1 000 H. P. which would be needed for main line purposes, the radiator required would have to get rid of 650 000 calories (2 579 400 B. T. U.) per hour when the engine was running at a speed of 10 to 15 km. (8.7 to 9.3 miles) an hour, for example. The difficulty of getting a radiator of this size into the loading gauge and of providing a suitable arrangement of motor driven fan which will be both efficient and sufficiently light will be appreciated.

Advantages of Diesel motors for traction.

The experimental stage as regards traction by Diesel motor has been passed. Suitable types of Diesel motors are now available and satisfactory drives between the motor and the driving wheels have been perfected. At the present time there are in use large numbers of Diesel locomotives, some of high power; some of the locomotives have been in use several years and meet all traffic requirements satisfactorily.

The increasing success of the Diesel locomotives is due to the important benefits obtained in use, as we shall see, whether compared with steam traction or with electric traction.

Comparison with steam traction.

Fuel and oil saving. — One of the principal advantages of the Diesel locomotive is due to the comparatively high thermal efficiency of the motor, which may be as high as 36 %. This efficiency, it is true, is not the only factor to be considered, as the power must be

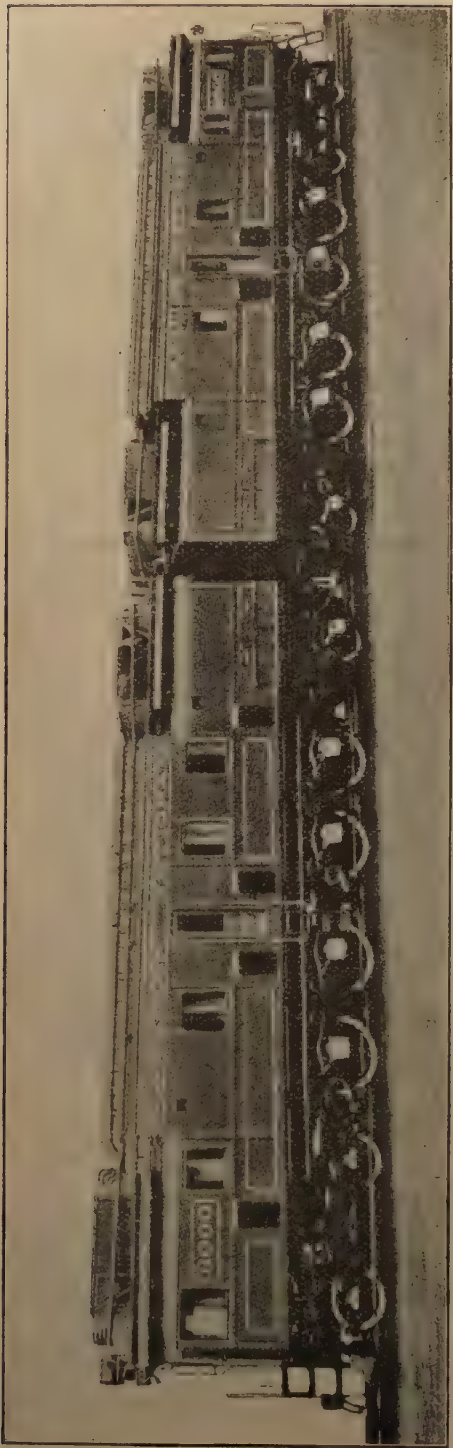


Fig. 1. — 2 260-H. P. Diesel-electric locomotive of the Canadian National Railways.

transmitted to the wheels; with the present day drives, the efficiency of a Diesel locomotive is at least four times greater than that of a steam locomotive of the same power.

The Diesel locomotive only uses water for cooling purposes; consequently the consumption of water may be overlooked, a valuable feature for operation in hot countries. Owing to this feature, the Diesel locomotive is the only possible type for railways in desert regions.

Handling and storing the fuel on the locomotive. — The Diesel locomotive consumes a very small quantity of liquid fuel of high calorific value : 10 000 to 10 500 cal./kgr. (18 000 to 18 900 B.T.U./lb.) as compared with 7 000 to 7 500 (12 600 to 13 500 B.T.U./lb.) in the case of coal. The substitution of liquid fuel for solid fuel of itself shows many benefits. In view of the comparatively low specific consumption of high calorific value fuel, the quantity of fuel to be carried for a given distance is appreciably less so that, if desired, a Diesel locomotive can run a greater distance without refuelling.

Fuel and water supplies. — As fuel and water need only be taken once a day, the extensive and costly coaling and water plant required for steam traction can be replaced by simple tanks. In addition the fuelling points for Diesel locomotives can be concentrated at the main terminals, which means further economies whilst at the same time the working is simplified.

Speed with which engines can be prepared or stabled. — The Diesel locomotive can be got ready for service in a few minutes, whereas at least half an hour is required to raise pressure in a steam locomotive : the result of this is that, in order to meet unexpected demands, a certain number of locomotives have to be kept in steam in the depots. The fuel consumption of these engines

may be estimated at about 5 % of the total. This supplementary consumption is avoided when Diesel locomotives are used. Similarly, a Diesel locomotive can be put away in a few minutes whereas in the case of the steam locomotive the fire has to be thrown out first of all and the ash pans cleaned.

Possibility of working very long hours each day. — A steam locomotive can only remain in continuous service a few hours after which the grate has to be cleaned. A Diesel locomotive can remain in service the whole day and can do the same work as two or three steam locomotives of equal power.

Staff savings. — In the case of steam traction, much time is taken in raising steam as in throwing out the fire. With the Diesel locomotive, no such work has to be done so that the enginemen can do more effective service in the same working day, the more so as the Diesel locomotive is not tiring to drive. Most of the shunting operations concern starting and stopping and can be easily covered by one man without the proper observation of the signals being affected. The driver has, moreover, a much better view of the line as the driver's compartment is usually at the leading end.

Life and maintenance costs. — The repair shops for dealing with Diesel locomotives can be on a smaller scale, given equal conditions, as no provision has to be made for repairs to boilers. In addition the long life of Diesel locomotives is well known. Even for an intensive service, the annual costs of repairs do not exceed 1 to 1.5 % of the purchase price, which is a much lower figure than for the boilers. The example of marine applications has demonstrated the robustness and reliability of Diesel motors; there are marine engines which have been in service 15 and even 20 years. As a matter of fact, this type of motor is used without hesitation for driving single-screw vessels, the safety of which, under adverse conditions, depends largely on the proper working of the motor. Finally experience shows that in the mercantile marine the costs of repairs to the machinery are lower in the case of Diesel-engined vessels than in the case of steamers.

The benefits resulting from the absence of smoke, and the removal of the risk of fire due to sparks from steam locomotives should also be mentioned.

Comparison with electric traction.

The Diesel locomotive also possesses certain advantages over electric traction. It can work over any section as it is not obliged to follow a contact line. This system can be put into service progressively, without it being necessary to equip the lines specially, nor to change at one stroke the locomotive stock; a start can be made by purchasing a limited number of units.

Electric traction suffers from any disturbance in the power stations; the Diesel locomotive is obviously exempt from this drawback. In war time, the destruction of the power stations would paralyse a wholly electrified railway system whilst the Diesel locomotive can continue in service as long as the track remains intact. If the purchase price of a Diesel locomotive is higher than that of an electric locomotive of the same power, electric traction involves costly power stations, transformer stations and distribution lines : it is consequently only really profitable in the case of congested lines with heavy traffic (1).

Discussions of the operating economies obtained by using Diesel motors for traction purposes.

One of the most important advantages of the Diesel locomotive is the economy

(1) See the economic comparison between steam and electric traction in the *Génie Civil* of the 11 June 1929, page 599.

effected. The argument must of course not be limited to the maximum thermal efficiency of the locomotive, but the actual conditions under which the locomotive is used must be taken into account. The results of the comparison with a steam locomotive may differ very much according as an uninterrupted run under full power, or intermittent service is considered.

The traction costs can be classified under three headings : costs relating to the locomotive itself, cost of consumable stores, and wages.

Costs relating to the locomotive itself.

Interest and amortization charges. — Under present conditions, the initial cost of a Diesel locomotive is only slightly more than double that of a steam locomotive; future progress will undoubtedly result in the comparison being more favourable to the Diesel. However, as we have pointed out, the Diesel locomotive can be in service a much longer period each day than a steam locomotive. To cover a given service, fewer Diesel locomotives are needed than steam locomotives of equal power, and the capital required to form a locomotive stock is much less than twice that required to built up an equivalent stock of steam locomotives.

Furthermore, the life of a Diesel locomotive should not be less than that of a steam locomotive; as a proof of such long life may be quoted, amongst other examples, that of the two 200-H. P. Sulzer rail motor cars supplied in 1923 to the Val de Travers Railway in Switzerland. These two cars, which are still in service, have run up to date 550 000 km. (341 750 miles); they run 135 000 km. (83 900 miles) between repairs without stripping down the motor. The cost of a complete overhaul corresponding to restoration to new condition is only 6 000 Swiss francs.

Cost of workshop repairs. — Based on the experience of stationary or marine Diesel engines, the annual cost of repairs to these motors may be calculated at 1 or 1.5 % of the purchase price.

In addition, the annual repair cost of steam locomotives varies between wide limits according to the type of machine; 15 % of the cost of the machine may be taken as an average figure.

The repairs to the vehicle (running gear) may be taken as one third of the total, that is as 5 % of the purchase price of the locomotive.

The value of the frame and running gear represents 75 % of the total cost in the case of a steam locomotive. The cost of the repairs to the running gear annually is therefore $\frac{5}{0.75} = 6.66$ % of the value of the running gear.

These factors enable us to calculate the annual costs of repairs of a Diesel locomotive, seeing that we know that the motor and transmission represent 60 % of the value of the locomotive, the value of the frame and body accounting for the balance of 40 %. If D represents the purchase price of the Diesel locomotive, the cost of the motor and transmission is therefore 0.6 D, and the annual cost of the repairs to this part of the locomotive, as we have seen above, amounts to 0.01 to 0.15 × 0.6 D, that is 0.006 to 0.009 D.

We know that the cost of the frame and running gear is 0.4 D and that the annual repair cost is 0.066 × 0.4 D or 0.026 D.

The total annual cost of repairs of a Diesel locomotive therefore amounts to 3.2 to 3.5 % of the purchase price. In order to take the least favourable conditions for the Diesel, the cost of Diesel locomotives delivered to date will be used, that is to say the cost of locomotives built as units and not in series as is the case with steam locomotives.

The purchase price of a Diesel locomotive under these conditions is about 2.5 times the purchase price S of a steam

locomotive for working the same service, so that D = 2.5 S. The annual repair cost of a Diesel locomotive, when compared with the value S consequently amounts to between 3.2 × 2.5 % and 3.5 × 2.5 % that is to say between 8 and 8.7 %. The corresponding value for the steam locomotive, as already stated, amounts to 15 %.

These figures may be compared with those given by Mr. Bearce for the North-American locomotives. According to this writer, the total cost of repairs per hour in service of a locomotive is 1.07 dollars for steam and 0.56 dollar for Diesel locomotives respectively.

Interest and sinking fund charges on the capital investment in locomotive depots and repair shops. — Much of the plant required in connection with steam traction is either not needed when Diesel locomotives are used, or can be reduced considerably.

Under equal conditions, when Diesel locomotives are used, the size of the repair shops and the accommodation for the enginemen can be considerably reduced. The objection that the buildings and plant are already in existence may be raised but this is not the case in many countries oversea.

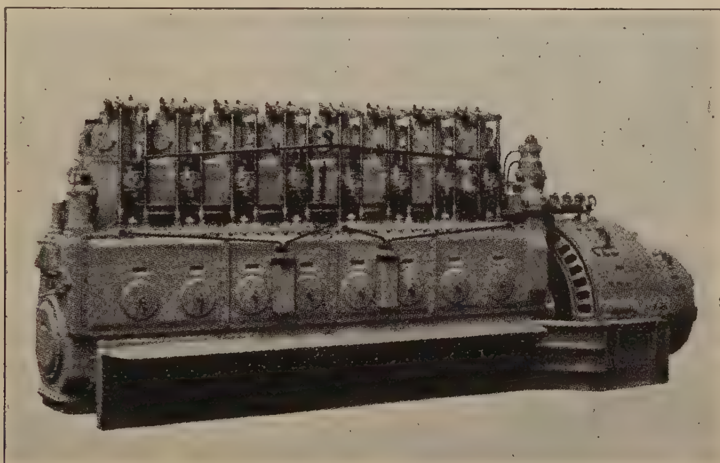


Fig. 2. — View of the 450-H. P. motor and the main generator of the Siamese Railways locomotive.

Consumption of usable stores. — Accurate information on the coal consumption of steam locomotives is given in a number of the reports presented at the Second World Power Conference (Berlin 1930).

According to Mr. Günther a modern steam superheated locomotive with the usual type of grate burns under steady working conditions on the level, at a speed of 80 km. (50 miles) an hour, 8 000 calories (31 750 B.T.U.) per drawbar horse power, which corresponds to a thermal efficiency of 7.9 %. For a tractive effort of 3 kgr. (6.6 lb.) per ton at this speed the consumption reaches 91 calories per tkm. (53 690 B.T.U. per Engl. ton-mile), equivalent to 13 grammes (12 drams) of coal of a thermal value of 7 000 cal./kgr. (12 600 B.T.U./lb.).

The use of the figures corresponding to steady working conditions, if applied to ordinary service conditions, would

give an entirely false idea of the coal burnt by a locomotive under such service conditions, as a large additional quantity must be taken into account for lighting-up purposes, for cleaning fires, throwing out fires, mileage from and to shed, shunting, and for station stops. Mr. Günther, in view of this shows that the consumption of a modern locomotive in normal service amounts to 177 calories per tkm. (104 430 B.T.U. per Engl. ton-mile), that is to say 95 % more than if the engine was always operated under steady running conditions. The fuel used for heating the train, during light running, shed shunting, pilot and spare duty must also be brought to account. The result is a much higher figure. The German National Railways in 1929 used a quantity of coal corresponding to 369 calories or 53 grammes of coal of 7 000 cal./kgr.per tkm. (49 drams per Engl. ton-mile, of coal of 12 600 B.T.U./lb.), or rather more than four times the consumption under steady working conditions. These figures compare closely with those from other sources as for example those Mr. Eugène Brillé gave for the French State Railways in his report on the use of liquid fuel engines for traction purposes.

In addition, the operating figures of the North American railways and of the Russian railways especially enable us to form an accurate idea as to the consumption of Diesel locomotives.

Taken as a whole, the Russian Diesel locomotives use in the same service one quarter the crude oil used by the steam locomotives of equal power.

The average thermal efficiency (at the draw bar) of a steam locomotive is of the order of 7 % whereas that of a Diesel locomotive reaches 21 %. The ratio of the efficiency is therefore 3 and not 4 as appears to be shown by the ratio of the quantity of heat units used. This difference is due to the fact that with Diesel locomotive traction, the fuel used when standing is nil; in addition when shunting at low speeds with many stops, the Diesel locomotive is particularly economical, because one of the characteristics of the Diesel motor is that its consumption remains low even when working light and at low power. This point is important as about 20 % of the coal consumed on the railways is used in shunting service.

Mr. W. D. Bearce has reported the interesting operating results obtained in the United States. During 1928, the gross operating costs of a steam locomotive related to the effective hour of work averages 7.7 dollars, and for a Diesel locomotive to 5.085 dollars only. The saving due to the use of Diesel locomotives is therefore 2.6 dollars per hour of effective service. It should be noted that in arriving at the gross operating costs, not only the costs of fuel and consumable stores but also the costs of repair, interest, and capital amortization and the wages of the driving staff, repair staff and supervisory staff have been brought into account. The fuel consumption per actual hour in service has become 1.21 dollars for the steam locomotive as compared with 0.36 dollar for the Diesel, that is to say one third, whilst the ratio of the cost of the gas oil relatively to that of coal per unit of weight was 2.5.

Lubricants. — The lubrication costs are higher in the case of Diesel locomotives on account of the motor and the transmission-gear.

A locomotive Diesel motor may be reckoned as using 2 grammes (1.13 drams) of oil per effective horse-power hour.

In the case of a locomotive running at an average speed of 35 km. (21.7 miles) per hour, this represents 60 grammes of oil per effective horse-power and per 1 000 km. (54.5 drams per effective H. P.-hour and per 1 000 miles) run.

In addition the axle boxes use 17 grammes of axle box oil per effective

horse-power-hour and per 1 000 km. (15.4 drams per effective H. P.-hour and per 1 000 miles) run, so that the total consumption per effective horse-power-hour is 77 grammes per 1 000 km. (70 drams per 1 000 miles) run. In the steam locomotive the consumption of cylinder oil per effective horse-power-hour is only 3 grammes per 1 000 km. (2.7 drams per 1 000 miles) run : adding 17 grammes for axle boxes, the total consumption becomes 20 grammes (18.2 drams) or one quarter that of the Diesel locomotive. But as the cost of lubricants in the case of the steam locomotive is only about 0.5 % of the total cost, the additional lubricating oil required by the Diesel locomotive is of little importance.

Wages.

We have already pointed out the saving of labour that has resulted from the use of Diesel locomotives, as there is no boiler nor firebox to look after. Mr. Bearce, in the report mentioned above, shows that on the North American railways the expenditure on enginemen's wages amount to 3.31 dollars in the case of steam locomotives and to 1.66 dollars in the case of Diesel locomotives per hour in normal service. The Diesel locomotive therefore shows a saving of about 50 % of the cost of wages of the locomotive men, and this saving can even be bettered seeing that in many cases it can be single-manned.

The problem of adapting the Diesel motor to railway traction.

Conditions required of a locomotive : comparison between the steam engine and the Diesel motor.

A locomotive must fulfil the following technical conditions, amongst others :

1. Start with a heavy load coupled to the drawbar hook;

2. Accelerate quickly up to the working speed;

3. Maintain the working speed closely in spite of the variations in tractive resistance met on the journey.

The steam engine and the Diesel motor are entirely different as regards fulfilling these three conditions.

Starting. — The reciprocating steam engine is particulary good in this respect, as it can draw instantaneously on

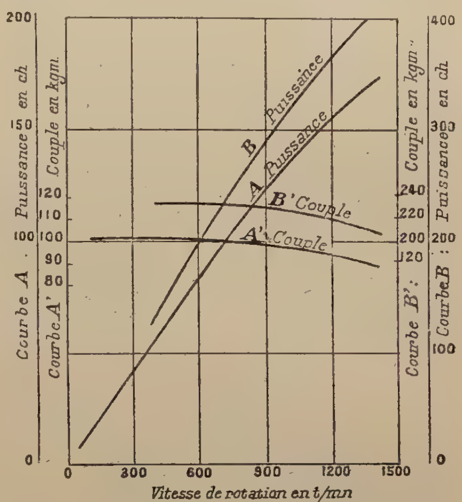


Fig. 3. — Diagram of power and couples of two full-injection Diesel motors.

The curves A and A' relate to a motor with compressed air injection, the curves B and B' to a motor with solid injection, both built by the same firm.

Note. — Couple en kgm. = Couple, in kilogrammetres. — Courbe A (B) Puissance en ch. = A (B) power curve, H. P. — Vitesse de rotation en t/mn. = Speed of rotation, r. p. m.

the reserve of energy provided in advance in the boiler.

The internal combustion motor, on the contrary, is not good for starting purposes. It cannot start itself : moreover the burning of the fuel in the cylinder only occurs in a suitable manner when the angular speed exceeds a certain critical value. To get a Diesel locomotive to start involves therefore the provision of suitable starting gear.

Acceleration. — In order to get the greatest possible acceleration the available adhesive weight must be made use of to the maximum extent. The steam engine would fulfil this condition if the boiler could meet the demands on it at all times. But the limits of the loading gauge and the allowable weight control the maximum steam production and the maximum power of the engine. As soon as the steam capacity of the boiler is reached the turning effort falls almost in inverse ratio to the speed : the acceleration also falls off simultaneously.

The internal combustion motor on the contrary, provided the degree of admission is kept constant, maintains a practically constant turning moment (fig. 3) : from the point of view of the variation of the turning effort, it therefore satisfactorily fulfils the desired conditions for optimum acceleration. The comparison, to be exact, should, however, be between locomotives of the same maximum power : now these two machines develop the same effort at high speed but as the speed falls the effort of the steam locomotive increases whereas that of the Diesel supposed to be directly driven remains practically constant.

A locomotive with an ordinary Diesel motor directly coupled to the wheels would, therefore, be inferior to a steam locomotive of equal power because during the whole of the period of varying output it would have developed an instananeous couple inferior to that of the steam engine.

The Diesel locomotive consequently is also inferior to the steam locomotive from the point of view of acceleration and this reason again shows the necessity for either modifying the form of the Diesel motor power effort or for interposing an intermediary device between the motor and the wheels.

Running at normal speed. — The power curves of the steam locomotive and of the Diesel motor are essentially different in form.

The usual design of steam locomotive develops for speeds increasing from zero a tractive effort T equal to the possible practical maximum, that is to say to the adhesion T_m. This is the case up to a speed V_r at which the steam consumed in the cylinders equals the maximum quantity of steam the boiler can produce.

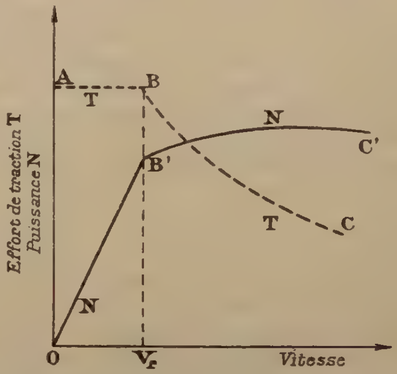


Fig. 4. — General form of the power curve N and of the tractive effort curve T, of a steam locomotive.

Note. — Effort de traction = Tractive effort. = Puissance = Power. — Vitesse = Speed.

Corresponding to the horizontal segment A B of the tractive effort curve (fig. 4), there is the straight part O B' of the power curve. From B' the power remains almost constant and equal to the upper limit fixed by the evaporative power of the boiler. We have therefore, corresponding to the horizontal section B' C' of the power curve, a hyperbolical arc B C for the tractive effort curve $T = \frac{270N}{V}$ (N, effective horse power; V, speed of the locomotive in kilometres per hour).

In the case of the Diesel motor, its power curve relatively to the number of revolutions in unit time practically follows, as we have already seen (fig. 3), a straight line which starts close to the

point of origin, its lower limit corresponding to the minimum speed required for firing the cylinder charge. There is therefore from this point of view a very marked difference as compared with the steam engine.

Experience shows, however, that the form of the power curve of the steam locomotive is very suited for railway traffic needs. To adapt the Diesel locomotive to rail traffic, it is therefore necessary either to interpose between the motor and the wheels a transmission gear to regulate the ratio between the engine and axle speeds, or by altering the characteristics of the motor (supercharging, Still system, etc.) to model the power curve of the Diesel locomotive on that of the steam locomotive in terms of the running speed of the locomotive. This is the essential matter in adapting the Diesel motor to rail traction.

These methods may be classified under three groups :

1. *Systems using indirect transmission.* — These systems naturally fall under four headings according to the nature of the transmission : electric, mechanical, hydraulic or pneumatic.

2. *System with direct transmission.* — At the present time there are but two such systems :

a) Supercharging the Diesel motor. This supercharging ought to be designed to produce at all times an average pressure in a given ratio with the average pressure in the steam locomotive cylinder at the same running speed.

b) Still system using steam pressure as an auxiliary. This system is the only one that has been applied in practice and forms a simple method of modeling the characteristics of the Diesel locomotive on those of the steam locomotive.

3. *Mixed systems.* — These include the use at one and the same time of a main motor with direct transmission and an auxiliary motor driving through an indirect transmission.

Comparison between the different transmission systems.

Electric transmission. — Of the different methods of transmission used on Diesel locomotives, electric transmission is the one that has been most widely used up to date (fig. 1 and 2).

Electric transmission in itself is not new, seeing that electric locomotives are already in use. It is inevitably costly as it involves a double transformation of energy with one generator and one or more electric motors, but when well designed it requires very little attention. With electric transmission the ratio of the transmission between the motor and the wheel can be varied by very small steps and even continuously. The acceleration can in this way be arranged to suit the service for which the locomotive is intended.

Electric transmission has the further advantage of allowing the Diesel motor to be spring suspended and thereby protected from running shocks. Its efficiency may be as high as 85 %.

Against this, it is heavy and costly. The weight of the transmission gear on large locomotives of say 1 000 H. P. or over is 26 to 36 kgr. (57 to 79 lb.) per H. P. and the cost of the Diesel-electric locomotive is at least double that of a steam locomotive of the same power.

An investigation into the different systems of electric transmission actually in use would take us outside the scope of this article. We propose, however, to publish in the near future a general description of the locomotives built to the designs of Messrs. Sulzer for the Siamese Railways.

Mechanical transmission. — Of all forms of transmission in use, the mechanical presents most difficulties except for small powers. Up to the present there is only one high-power locomotive with mechanical transmission in regular service, and this is the 4-10-2 locomotive of the Russian Railways, built in

Germany by the M.A.N. Company and the Esslingen locomotive Works and described in the *Génie Civil* of the 28th August 1926.

The mechanical transmission in the case of the locomotive is nothing but the development of the automobile gear on a scale which involves serious material difficulties. First of all, so that the motor itself may be started up and to put the locomotive into motion, a clutch is needed to allow a certain amount of slip when starting : at this moment a heavy mass at rest and a motor running at something above the speed needed to fire the charge have to be connected. If there is no slip, the sudden start is liable to break the couplings or to stop the motor. The slipping of the clutch gives a continuous variation of the ratio of the transmission between the motor and the wheels up to the value at which the drive is fully taken up. In addition to this essential role, a clutch is required when changing gear and also to disconnect the motor when coasting down gradients.

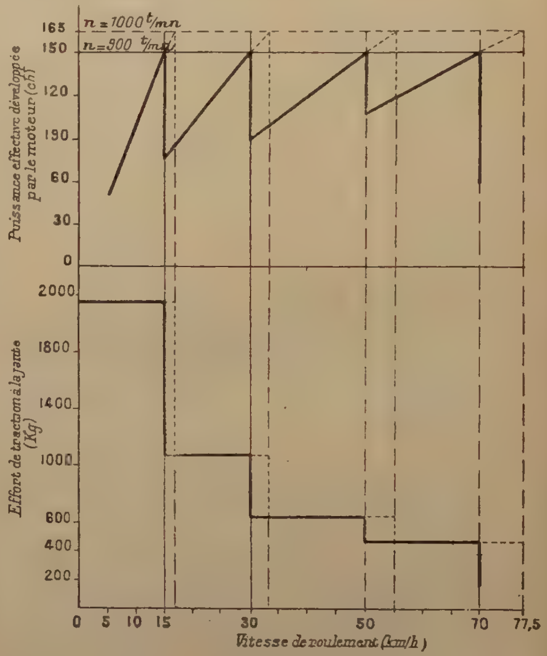
The difficulty of designing a sufficiently strong and at the same time progressive clutch will be appreciated when the magnitude of the couple to be transmitted is realised. On the above mentioned Russian locomotive a multiple-disc clutch is used, the plates being brought together by the magnetic attraction exerted on the clutch plate. This system has stood up well but involves a supply of continuous current and the control is rather complicated.

On the Diesel geared locomotive built by Krupp for the Maine Railroad, a hydraulic clutch is used.

Pneumatic clutches such as the Lipetz have also been put forward. The French Fieux « conjoncteur-disjoncteur », which is a purely mechanical and progressive clutch, may also be mentioned.

Another difficulty in the way of designing the mechanical transmission lies in the construction of the gear box. In order to be sufficiently flexible at least three speeds are required in addition to the reverse gear. Owing to the power to be transmitted the teeth have to be so wide and of such a modulus that the gear box which occupies so little room on an automobile can hardly be accommodated on the Diesel locomotive.

Moreover, the mechanical transmission is inferior in principle to both the elec-



Lines corresponding to the normal output (900 r. p. m. maximum speed).

Lines corresponding to supercharging the motor (900 to 1 000 r. p. m.).

Fig. 5. — Power and tractive effort curves of a rail motor car with mechanical drive, built by the Esslingen Works.

M. A. N. 150 to 165-H. P. motor. Gear drive. Weigt in working order 56 tons.

Note. — Effort de traction à la jante = Tractive effort at the tread. — Puissance effective développée par le moteur (ch.) = Effective power developed by the motor (H. P.). — Vitesse de roulement km/h = Speed, km. per hour.

tric and the pneumatic transmissions in one respect : whereas with these latter a nearly continuous variation of the gear ratio is possible the gear box only allows the maximum tractive effort corresponding to the full power of the motor to be varied by a very small number of steps, three or four (fig. 5).

At each of these steps the speed of the motor is in fixed ratio with that of the locomotive so that the motor cannot be made to develop its full power. This full power can only be got at certain speeds of the locomotive which equal in number the number of speeds in the gear box. Between these speeds the power is badly used. Consequently particular skill is required from drivers of geared Diesel locomotives as the driver must know the line perfectly so as to make the best use of the power of the motor at each moment.

The efficiency of the gear box is none too good and from this point of view the geared Diesel locomotive is little better than the electric or pneumatic transmission. Against this, the mechanical transmission is simpler, lighter and cheaper : it is the right one for locotractors and small shunting locomotives.

Hydraulic transmission. — Up to the present, the results of trials with hydraulic transmission have not been too good. The hydraulic transmissions, however, give a very regular couple and are very reliable in working : some of these gears give a continuously variable ratio between the motor and the wheels.

They have however the following real disadvantages :

a) Difficulty to get absolute tightness in the transmission against leakage of the oil generally used as the transmission fluid; the extent of the leakage grows as the oil loses its viscosity through heating up.

b) Need for a special radiator to cool the oil circulating in the transmission gear; the oil becomes heated in circulating through the passages necessarily of small sections arranged in the different parts of the transmission and this parasitical transformation of work into heat is the main reason for the low efficiency of hydraulic gear.

c) Inertia effects on the mass of liquid in the transmission.

d) Usually low efficiency : 70, 60 and sometimes only 45 p. c.

The hydraulic gears introduced include the Jeanney, Lentz, Rosen, Schumacher, Huwiler and more recently that of the Variable Speed Gear Co.

Pneumatic transmission. — For a long time air injection was considered the proper method, and each Diesel motor was provided with a compressor.

The idea followed of making the compressor large enough to absorb the full power of the motor and to use the compressed air so produced to feed cylinders of the locomotive instead of with steam.

The idea is an old one, as prior to 1908 the Thermolokomotivgesellschaft in Germany, and in 1910, Stuckenberg in Russia had prepared designs for Diesel locomotives with compressed air transmission.

The Italian engineer Zarlatti has suggested the use as fluid of the exhaust gases mixed with steam. In the Cristiani method steam is used exclusively, the pressure being raised by the compressor coupled to the Diesel motor. The compressed steam is reheated by the exhaust gases of the Diesel and then expands in the cylinders of the locomotive and passes into a low pressure receiver where it is cooled by air before returning to the compressor. In other words the Diesel motor and the compressor replace the boiler of a steam locomotive but the steam circulates in a closed circuit. A 450-H. P. locomotive on this principle has been built by Messrs. Krauss, of Linz (Austria).

The M.A.N. Company in conjunction

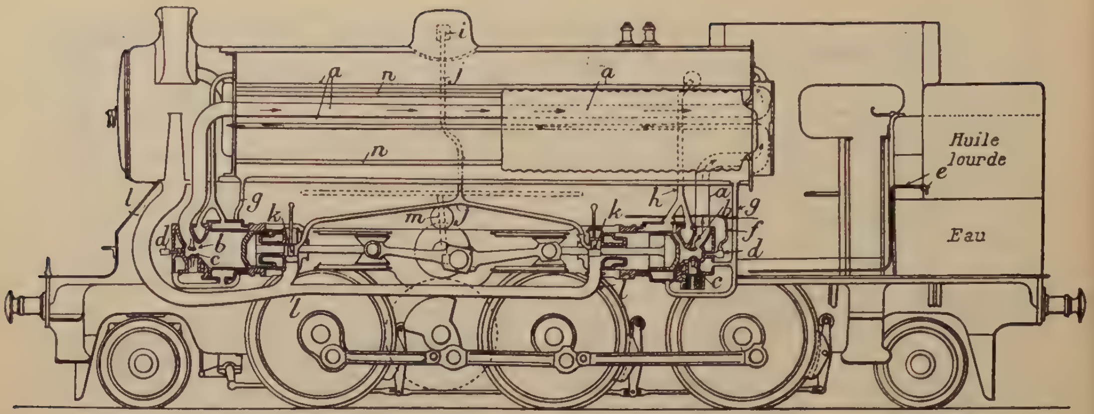


Fig. 6. — General arrangement of Kitson-Still locomotive.

a, exhaust combustion gases. — *b*, exhaust valve. — *c*, air admission valve. — *d*, heavy oil feed nozzle. — *e*, heavy oil suction pipe. — *f*, heavy oil delivery pipe. — *g*, incoming cooling water to jackets of cylinders. — *h*, outlet of cooling water from jackets of cylinders. — *i*, steam regulator. — *j*, steam admission piping. — *k*, steam piston valve. — *l*, steam exhaust pipe. — *m*, steam valve gear. — *n*, smoke tubes.

Note. — Huile lourde = Heavy oil. — Eau = Water.

with the Esslingen Locomotive Company built for the German State Railways a locomotive of 1 000 - 1 200 H. P. with pneumatic transmission which was described in the *Génie Civil* for the 24 May 1930; it had an overall thermal efficiency of 25 %.

Direct transmission with supercharging of the motor. — This system was used on the first Diesel locomotive built in 1911 for the Prussian Railways by the Klose, Sulzer and Borsig consortium. The motor was a two-stroke, which at starting worked on compressed air up to a running speed of 10 km. (6.2 miles) an hour : above this speed it was possible to fire the charge in the cylinders and the Diesel engine then took up the load.

It has been suggested that the ideal form of power curve of the steam locomotive can be obtained by using a Diesel motor with direct transmission with suitable supercharging. All that is needed is that, at the maximum speed of the Diesel motor not supercharged, the power shall be the same as that of the steam locomotive.

This however means a very high degree of supercharge and to avoid excessive pressures in the cylinders it would be necessary to vary at will the volumetric compression. When starting, one or several cylinders of the Diesel would work on compressed air until the angular speed was high enough for the ignition of the heavy oil. Under these conditions it would be necessary to add, to the main engine, an auxiliary motor capable of providing the power required, not only for driving the supercharger and the scavenging pump, but also of supplying the compressed air used by the main motor at starting. When the question is gone into closely, the auxiliary motor is found to be half the power of the main motor : it would be very badly utilised most of the time and would unfavourably increase the weight as well as the price of the locomotive.

Mixed internal-combustion and steam locomotive. — An interesting solution —

especially for high powers — for the transmission between the motor and the wheels is that of the mixed internal-combustion and steam locomotive.

A locomotive of this kind unites the fundamental advantages of the internal-combustion motor on the level or easy gradients and those of the steam locomotive when starting and on heavy gradients.

Already in 1919, the Esslingen Locomotive Works designed such a locomotive on the Mayer system, in which horizontal internal-combustion cylinders worked in parallel with steam cylinders.

At the present time one of the most interesting mixed systems is that of the Still Company (fig. 6). In this case the motor cylinders are double acting, the back end being the internal-combustion engine and the front end the steam. The water in the cylinder jackets is in communication with a boiler heated by the gases from the internal combustion ends of the cylinders.

When starting the boiler is fired by oil and the steam produced is used to drive the locomotive until the firing speed for the internal-combustion motor is reached.

During the tests of the Still locomotive the average effective pressure could be varied in the ratio of 7 to 1 and the speed in the ratio of 12 to 1.

Simultaneous use of a main motor with direct transmission and an auxiliary motor with indirect transmission, without supercharging. — Instead of using an auxiliary motor only temporarily for traction purposes when starting, a natural course with a view to securing a better utilisation, seems to make it cooperate in the traction work by means of its indirect transmission; the auxiliary motor thus deals with starting and remains properly utilised under other working conditions.

The chief drawback of the combination is that, at the maximum speed, the available power of the Diesel locomotive with direct and indirect drive combined is higher than the power of the steam locomotive capable of the same maximum tractive effort.

It is therefore greater than that required to haul a train of the weight determined by the adhesive weight; the power of the locomotive is badly employed and the construction is heavy and costly.

Combination of an indirect transmission with a motor not supercharged and a direct transmission with a supercharged motor. — By supercharging the motors with direct drive the drawback just pointed out can be removed. As the supercharging is reckoned upon to give the additional power required from the firing speed to the maximum, the sum of the power of the two transmissions is arranged to equal the corresponding maximum power of the steam engine.

In this way full use is made of the power of the locomotive at maximum speed, whilst at the same time the relative importance of the less efficient indirect transmission is reduced to the value strictly necessary for starting. A lighter construction is obtained in this way and the overall efficiency is better.

Conclusion.

The Diesel motor now appears to be perfectly able to give regular and economical service on the railways when fitted to locomotives, rail motor cars and locotractors. Its use reduces the cost of fuel considerably and also produces appreciable economies in staff and repair costs. The size of the repair shops can be reduced very considerably and also that of the coaling and water plant. It also has the great advantage of making it possible to use the motive power intensively. Although the cost of Diesel locomotives at the present time is much greater than that of steam locomotives, traction by Diesel locomotives

can therefore show great economies as compared with steam traction and in particular in shunting service, in stations, in suburban services and in working branch lines.

Relatively to purely electrical traction, that by Diesel locomotive has the advantage that there is the same independence as with the steam locomotive, that large sums of capital are not locked up beforehand in the electrification and that the stock of locomotives has not to be changed over at a given moment; from the estimate that can be made under present conditions, traction by Diesel locomotives appears to be cheaper than electrification.

There is one field in which the Diesel locomotive is undoubtedly superior to all others. This is on colonial lines where water is bad — as in Algeria and Tunisia — or very scarce as in desert countries. The Diesel locomotive would appear to be the perfect machine for the Trans-Sahara railway where the distance between watering points is some 1 000 km. (620 miles).

Whilst the regular utilization of the Diesel motor for railway traction can be favourably considered today, the type of transmission most suitable to meet traffic requirements, especially as regards economy, regularity, and simplicity of handling, has still to be decided from the various methods suggested. The various systems of indirect transmission mentioned have undoubtedly been perfected and are convenient in use but they can be critisised as adding to the weight and the cost of construction as well as having to be interposed between the motor and the wheels with frequently an efficiency of much less than unity. The ideal would be to go as far as possible towards direct transmission, which method appears to be engaging the attention of inventors and, amongst the various methods that can be employed to achieve this object, supercharging undoubtedly offers one of the most efficient and neat solutions (1).

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(1) This article is a short summary of the important paper read by Mr. Delanghe before the Civil Engineering Congress held in Paris, in September 1931. This paper was published in the November-December 1931 Proceedings of the *Société des Ingénieurs Civils* in which it fills 250 pages; readers are referred to this paper for a fuller study of the question.

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Recent locomotive types of the French Nord Railway.

(*Les Chemins de fer et les Tramways*) (1).

The recent types of steam locomotives in use at the present time on the Nord Railway for the different classes of work are the following:

1. — *Pacific* locomotives, Class 3.1251 to 3.1290, for express trains weighing 500 of 650 tons.

2. — *Decapod* locomotives, Class 5031 to 5050 and 5101 to 5120, for heavy goods trains weighing 1 300 to 1 800 tons.

3. — *Consolidation* locomotives, Class 4301, to 4340, for goods trains not exceeding 1 600 tons.

4. — *0-10-0 tank* locomotives, Class 5611 to 5670, for shunting heavy goods trains.

The first three types are 4-cylinder compound superheated locomotives. The tank engine is a two-cylinder simple expansion locomotive. The dimensions and principal characteristics of these different engines are summarised in the table hereafter.

These up-to-date locomotives have been in service for more than 2 years and have given excellent results; they are highly efficient, run well and steam well. Before giving more detailed information upon the express *Pacific* engines a few general notes must be given on the goods engines.

I. — The goods locomotives of the 2-10-0 type can work trains of 1 800 tons over gradients of 1 in 200 and of 1 350 tons over 1 in 100 gradients. The second axle is driven by the inside low-pressure cylinders, whereas the outside high-pressure drive the third axle. The axle load is 18.1 t. (17.8 Engl. tons). The table shows that this engine is of normal and in no way exaggerated dimensions; the grate area is if anything small. The combustion has, however, been very fully gone into; the ratio of the superheating surface to the total heating surface is 35.4 %. Walschaerts valve gear with piston valves is fitted. The A.C.F.I. feed water heater of the mixer type is fitted as to all the powerful high-speed passenger locomotives in addition to two standby 10-mm. (3/8 inch) injectors.

II. — All these particular features are also to be found on the *Consolidation* locomotives. The grate area is the same but the heating surfaces are slightly smaller, and the ratio of the superheating surface to total heating surface is only 31.3 %. These eight-coupled goods engines are actually intended to haul rather lighter trains: on 1 in 200 gradients they can haul 1 600 tons. The maximum axle load is 19.5 t. (19.2 Engl. tons) which makes it possible to get a tractive effort at starting of 23.4 t. (51 580 lb.).

III. — The ten-coupled *tank* engine is essentially a shunting engine (shunting yards, station working, or for working trains short distances) and the whole of its weight is available for adhesion. The tractive effort at starting is 26 t. (57 290 lb.). It carries 4.5 tons of coal and 10.7 m³ (2 350 Br. gallons) of water, so that the adhesive weight varies between 76.5 and 91.7 t. (75.3 and 90.3 Engl. tons),

(1) Illustrations reproduced from *The Railway Engineer*.

	Pacific.	*Decapod.*	*Consolidation.*	*Tank.*
Class	3.1251—3.1290	5.031—5.050	4.301—4.340	5.611—5.670
Wheel arrangement	4-6-2	2-10-0	2-8-0	0-10-0
Type	4-cyl., compound	4-cyl., compound	4-cyl., compound	2-cyl., simple expansion
Total wheel base	10.420 m. (34 ft. 2 3/16 in.)	10.120 m. (33 ft. 2 7/16 in.)	8.460 m. (27 ft. 9 1/16 in.)	6.200 m. (20 ft. 4 1/8 in.)
Rigid wheel base	4.020 m. (13 ft. 2 1/4 in.)	5.320 m. (17 ft. 5 7/16 in.)	5.960 m. (19 ft. 6 5/8 in.)	6.200 m. (20 ft. 4 1/8 in.)
Grate area	3.5 m² (37.66 sq. ft.)	3.22 m² (34.65 sq. ft.)	3.22 m² (34.65 sq. ft.)	2.27 m² (24.23 sq. ft.)
Boiler pressure	17 H.P.Z. (246 lb. in²)	17 H.P.Z. (246 lb. in²)	16 H.P.Z. (227 lb. in²)	14 H.P.Z. (203 lb. in²)
Heating surface :				
Firebox	20.3 m² (218.4 sq. ft.)	17.38 m² (187.0 sq. ft.)	17.38 m² (187.0 sq. ft.)	11.70 m² (125.9 sq. ft.)
Tubes	194.5 m² (2 092.8 sq. ft.)	158.45 m² (1 704.9 sq. ft.)	126.21 m² (1 358.0 sq. ft.)	135.85 m² (1 461.7 sq. ft.)
Total	214.8 m² (2 311.2 sq. ft.)	175.83 m² (1 891.9 sq. ft.)	143.59 m² (1 545.0 sq. ft.)	147.55 m² (1 587.6 sq. ft.)
Superheating surface	57.2 m² (615.5 sq. ft.)	62.23 m² (669.6 sq. ft.)	45.0 m² (484.2 sq. ft.)	... ...
Total heating surface including superheating.	272.0 m² (2 926.7 sq. ft.)	238.06 m² (2 561.5 sq. ft.)	188.59 m² (2 029.2 sq. ft.)	147.55 m² (1 587.6 sq. ft.)
Cylinders : 2 high pressure :				
Bore	440 mm. (17 5/16 in.)	490 mm. (19 1/4 in.)	420 mm. (16 1/2 in.)	610 mm. (24 in.)
Stroke	660 mm. (26 in.)	640 mm. (25 1/4 in.)	640 mm. (25 1/4 in.)	660 mm. (26 in.)
2 low pressure :				
Bore	620 mm. (24 3/8 in.)	680 mm. (26 3/4 in.)	570 mm. (22 7/16 in.)	... ...
Stroke	690 mm. (27 1/8 in.)	700 mm. (27 1/2 in.)	700 mm. (27 1/2 in.)	... ...
Diametre of the wheels :				
Driving	1 900 mm. (6 ft. 2 3/4 in.)	1 550 mm. (5 ft. 1 in.)	1 550 mm. (5 ft. 1 in.)	1 350 mm. (4 ft. 5 1/8 in.)
Leading bogie or truck.	950 mm. (3 ft. 1 3/8 in.)	1 040 mm. (3 ft. 4 15/16 in.)	1 040 mm. (3 ft. 4 15/16 in.)	... ...
Trailing truck	1 040 mm. (3 ft. 4 15/16 in.)	... ...	... ...	... ...
Weight in working order :				
Adhesive weight	56.8 t. (55.9 Engl. tons)	90.2 t. (88.7 Engl. tons)	75.7 t. (74.5 Engl. tons)	76.5 t. (75.3 Engl. tons)
Total weight	100.5 t. (98.9 Engl. tons)	101.3 t. (99.7 Engl. tons)	86.5 t. (85.3 Engl. tons)	91.7 t. (90.2 Engl. tons) tanks full
Maximum tractive effort :				
Simple expansion	23 030 kgr. (50 780 lb.)	35 295 kgr. (77 820 lb.)	23 392 kgr. (51 580 lb.)	25 980 kgr. (57 290 lb.)
Compound expansion	17 160 kgr. (37 840 lb.)	25 595 kgr. (56 440 lb.)	17 150 kgr. (37 820 lb.)	... ...

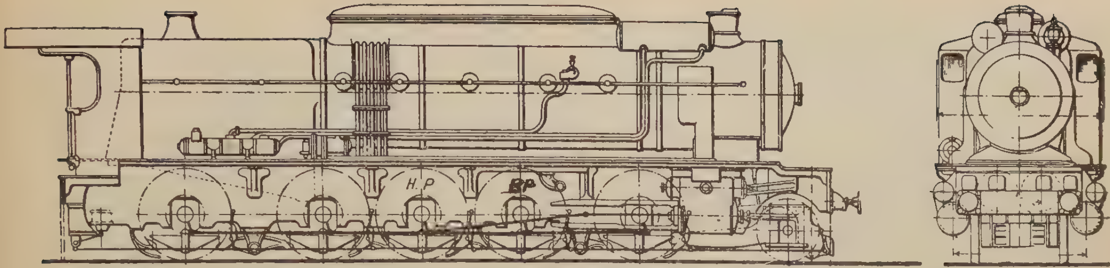


Fig. 1. — *Decapod* locomotive, Class 5031-5050.

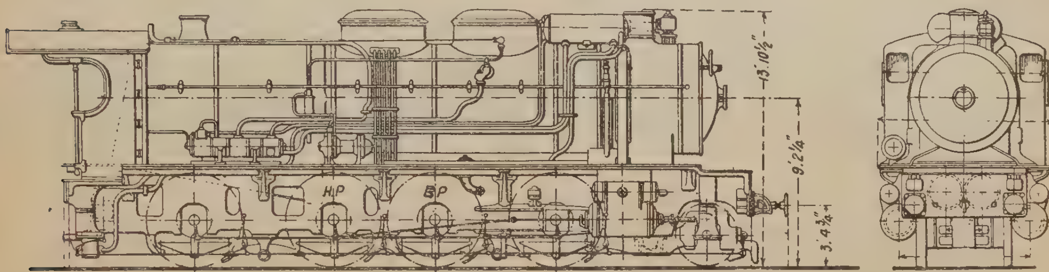


Fig. 2. — *Consolidation* locomotive, Class 4301-4340.

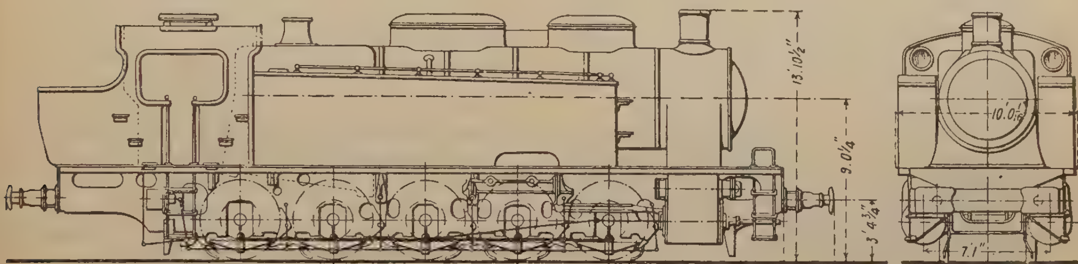


Fig. 3. — *Tank* locomotive, Class 5611-5670.

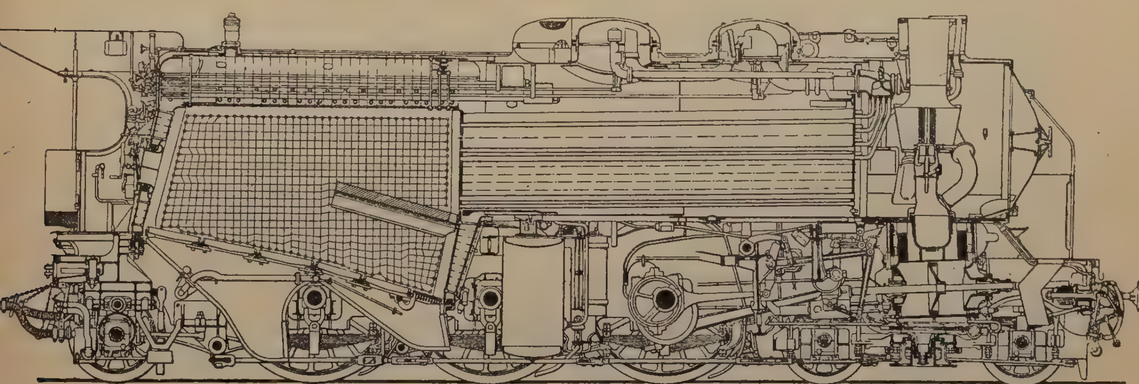


Fig. 4. — *Pacific* locomotive, Class 3.1251-3.1290.

according as to whether the bunkers and tanks are empty or full. The maximum axle load is 19.2 t. (18.9 Engl. tons), the trailing coupled axle being the most heavily loaded.

The boiler with its fittings is the same as those of the previous engines, but the grate area is less, as total power and speed are not the objectives sought for. In order to facilitate shunting, the reversing gear is operated by compressed air. This type of shunting engine is in use at many places on the Nord system.

Pacific locomótive.

The 40 locomotives for working express trains belonging to the 3.1251 to 3.1290 Class are derived from the first *Super Pacifics,* numbers 3.1201 to 3.1250 which have been in service 6 years already. Every endeavour has been made to improve them, not only as regards the working (high speed, higher efficiency, etc.), but also as regards ease of repair and their appearance. These engines were built by Messrs. Cail under the control of the locomotive department of the Nord Railway.

Intended to haul express trains of 500 to 650 tons, and capable of maintaining the highest speeds without difficulty and of climbing gradients of 1 in 200 at speeds of over 90 km. (56 miles) an hour, these up-to-date engines (although they have been in use just over 2 years) have been designed to give high sustained speeds with low fuel consumption. Particular care has been given to the steam passages to prevent wiredrawing and undesirable resistance to the steam flow. All the improvements in 4-cylinder compound locomotives are incorporated such as superheating, feed water heating, and independent high and low pressure valve gear.

The firebox, of the Belpaire type, extending down between the frames, is narrow and deep. The length is 3.150 m. (10 ft. 4 in.) and consequently the direct heating surface is considerable. The firebox sides and crown are a one piece sheet of copper 16 mm. (5/8 inch) thick. The roof stays are manganese copper. The wide rectangular firebox door with deflector closes automatically if there should be any pressure in the firebox, as required by the regulations in the case of superheated boilers.

The boiler, the pressure of which is 17 H. P. Z. (246 lb. per sq. inch) has 2 rings only : these rings are made of high tensile steel 19 mm. (3/4 inch) thick and their inside diametre is 1.728 m. and 1.766 m. (5 ft. 8 1/32 in. and 5 ft. 9 17/32 in.). The cover plates have three rows of rivets on the inside and 2 rows on the outside. There are two steam domes: the forward dome contains the main regulator and the back dome an auxiliary regulator of small dimensions for admitting steam directly into the low-pressure cylinders at starting. The domes are welded to the barrel just as the chimney is welded to the smoke box; pressings and welding have been used extensively on these engines.

The superheat is obtained from large diametre Schmidt elements. The ratio of the superheating surface to the total heating surface is in this case 26.8 % only; it is lower than in American express engines, but the latter are simple expansion.

Separate valve gears operating piston valves for both high and low pressure cylinders are fitted. The maximum pressure in the intermediate reservoir is 8 H. P. S. (118 lb. per sq. inch). The section of the steam passages has been made as large as possible; this is why the valve travel is rather great : 160 mm. (6 5/16 inches) for both the high and low pressure valves. These piston valves have moreover been lightened to the last degree so as to reduce inertia effects at high speeds. The boiler is fed by an A. C. F. I. feed water heater and two 10-mm. (3 15/16 inches) injectors for use in emergencies.

The frame has been strengthened by

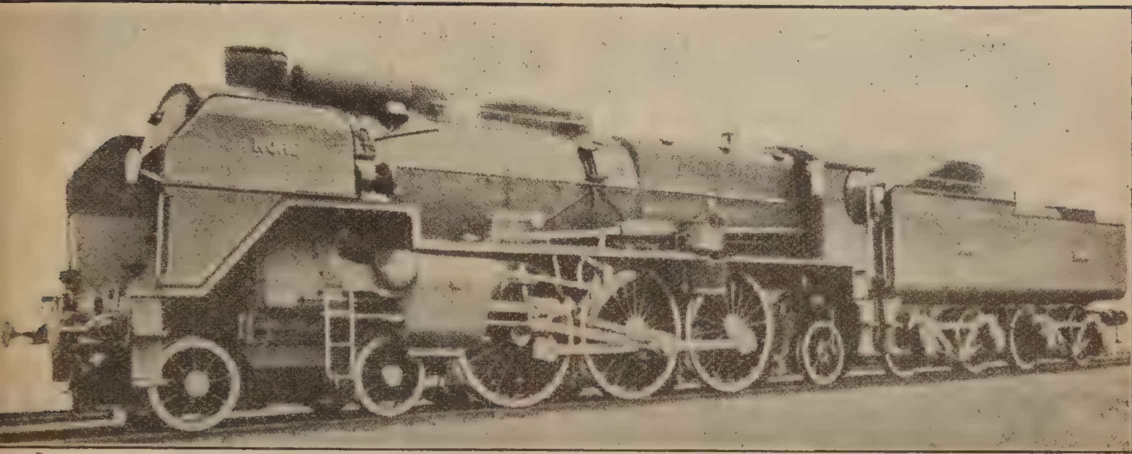


Fig. 5. — General view of *Pacific* compound express locomotive.

using thick and deep frame plates with as few lightening holes as possible. These frame plates are cross stayed by cast steel box stays of large size. The staying extends from the front end of the low pressure cylinders to the first crank axle. The frames end in line with the cylinders and are continued by cast steel saddles bolted to the frame plates themselves at their back end and at the front end to the short frames supporting the front head stocks. In this way, although the distance between the frames is 1.240 m. (4 ft. 13/16 in.), it has been possible to make the low pressure cylinders 620 mm. (24 3/8 inches) in diametre and at the same time the rigidity of the frame has been improved.

The bogie can move laterally 65 mm. (2 9/16 inches) on each side of the centre; and the trailing truck 85 mm. 3 3/8 inches).

The bogie laminated control springs are conjugated and are under a load of 5.9 tons at full travel. The distribution of the loads on the bogie and on the trailing truck have been very carefully investigated. It will be noted that, contrary to American practice, the load on the bogie (16 t. = 15.7 Engl. tons) is considerably higher than that on the trailing axle (12.8 t. = 12.6 Engl. tons).

The brake equipment, of the Westinghouse automatic type as usual includes a bi-compound pump. The braking coefficient is 53 %. The sanders, of the Leach slide valve type, are operated by compressed air. There is, in addition, a standby sander operated by a compressed air servo-motor.

The different parts of the locomotive are lubricated under pressure by 2 mechanical lubricators, divided into sections, with 10 feeds. Single slide bars have been used to get better lubrication.

The lighting on the locomotive (as on all Nord engines now) is by a 1 500-volt turbo-generator which supplies current for lighting the headlights and the cab and for the examination and maintenance of the different inside and outside parts of the engine. The lighting of a rake of vehicles can also be covered by it.

The steam for heating the train is taken from a special valve.

The turbo-generator, the air pump, the feed water pump, and the other auxiliary parts are mounted on the main frame.

The outside appearance of this engine and in particular the profile of the foot plating and the continuity of line generally have been the object of careful study.

The tenders coupled to these engines have been designed to run long distances without taking fuel or water at intermediate points. The tenders hold 37 m³ (8 140 Br. gallons) of water and carry 9 tons of coal. The leading bogie of the tender is given 55 mm. (2 3/16 inches) lateral movement on both sides of the centre; the axis of the trailing bogie is fixed. The tender wheels are braked to 50 %.

This locomotive is classified as capable of developing 2 230 H. P. continuously. In actual fact it develops more. The work done by the engines each day is extremely heavy.

In the middle of April 1932 speed and endurance tests were carried out succesfully; they resulted in a new speed record to the credit of French steam locomotives. The 51-km. (31.6 miles) run from Paris to Creil on which there is the Survillers bank of 1 in 200, 18 km. (11.2 miles) long, was covered in 30 minutes (including starting, service slacks leaving Paris, and stopping). Over several kilometres on the outwards and return trips (between Survillers and Pierrefite) a speed of 140 km. (87 miles) an hour was recorded. This is undoubtedly a record and deserves to be reported. The train hauled weighed 480 tons behind the tender.

This type of engine made it possible to work the Paris-Lille service (251 km. = 156 miles) regularly as from the 22 May 1932 in 2 hours 40 minutes, a very fine performance.

These few figures demonstrate that steam traction has nothing to learn from electric traction when it is a question of long-distance express trains running over main lines with reasonable gradients.

H. P.

[625. 123 (.73)]

Why some roadbeds hold water and how to get rid of it.

((*Railway Engineering and Maintenance.*)

The subject of subsurface drainage is one regarding which there has been a dearth of authentic information despite the fact that maintenance of way officers are confronted almost daily with problems concerning the proper drainage of the roadbed. With this situation in mind, the Committee on Roadway of the American Railway Engineering Association, through a subcommittee headed by G. S. Fanning, chief engineer of the Erie, prepared a report on the subject which was presented at the recent convention of the association at Chicago. The report, which was adopted for publication in the Manual, is abstracted below.

Subsurface drainage may be defined as the control and removal of excess moisture contained in the soil. Such moisture, when present in the roadbed, is detrimental in four respects: *a*) It greatly reduces the bearing power of soils of all kinds, some more than others, resulting in soft spots; *b*) under freezing conditions it causes heaving of the

track; *c*) in the event of an increase or a decrease in the amount of excess moisture, unequal swelling or shrinkage results in the displacement of the track, and *d*) it often leads to subsidence and slides.

The moisture of the soil is of two kinds — gravitational and capillary. Gravitational water is free to move under the influence of gravity, and can

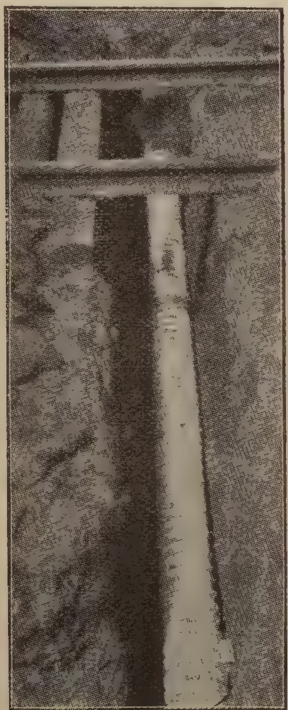


Fig. 1. — Installing a lateral drain.

be removed by ditches, drain pipes or other means. Capillary moisture, on the other hand, is tenaciously retained in soils through which free water has passed or which are in contact with wetter soils, by the attraction between the soil particles and the water and the surface tension of the water. Evaporation is the only agency that will remove water from such soils and it may be only partially successful, even after connection with outside sources of water has been removed. It cannot be removed directly by drainage, but can be controlled somewhat by lowering the water table. The amount of capillary moisture that can exist in a soil depends upon the shape, size and mineralogical composition of the soil particles; the greater the proportion of surface area of the particles to the total mass and the greater the percentage of clay, the greater the amount of capillary water.

Drainage problems are definitely related to the mineralogical composition of the material involved, the physical condition of the mineral material, and the local geological and climatic conditions which determine the source, or sources, of water. The United States Bureau of Soils has classified soils according to their composition as indicated graphically in the tri-axial soil classification chart and tabulations shown herewith. The adverse character of a roadbed soil depends on (1) its volume change with variations in moisture content or under frost action, (2) its plasticity, that is, its tendency to flow under load, which affects its bearing power, and (3) its tendency to flow because of its content of rounded sand and silt particles. The track may be displaced as a result of any one of these conditions. The kaolinite group and other micaceous-like minerals, which are important constituents of clays, affect the moisture content of a mass and its plastic properties in proportion to the extent to which they have been broken up into thin plates along the cleavage planes. So far as the stability of the mass is concerned, the term « sand », unless qualified, is misleading. Wet or dry, highly rounded sand and siliceous silts behave very differently from angular sand and silt. The adverse character of a soil, as affected by the presence of water and

manifested by vertical swelling, increases with the clay content.

Field tests for soils.

The clay content of a soil is indicated and the soil identified as good, doubtful or poor for use in a railroad roadbed by a simple and practical field test, known as the « field moisture equivalent » test. The field moisture equivalent is the amount of water, expressed as a percentage of the dry weight of the soil, which it will absorb because of surface tension and adhesion (capillary water). It has been found that generally within

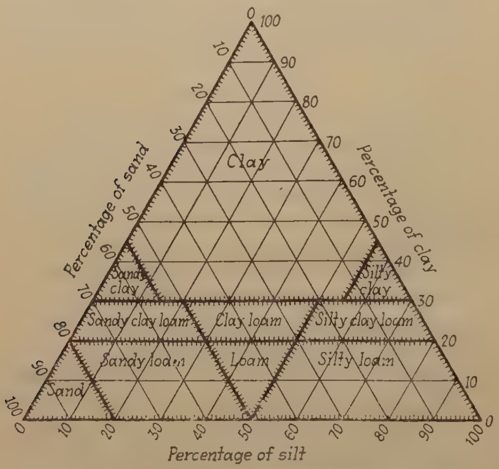


Fig. 2. — A tri-axial soil classification chart.

the critical limits the « field moisture equivalent » varies directly with the linear expansion of the material due to the absorption of water. It can be determined by the following method.

Use a small tinned iron pan, say 2 in. by 6 in. by 1 in. deep, with many perforations in the bottom. Cover the bottom with thin blotting paper and, after weighing the vessel thus prepared, fill it with the material to be tested which has been thoroughly dried and powdered. In order to allow for possible swelling of the material it should fill the pan not quite to the top after being compacted by shaking gently. After weighing the vessel again set in on a support in a wide pan of water so that the surface of the water just covers the blotting paper. Within half an hour or two absorption will be approximately complete and if the pan is allowed to remain on the water over night it will be entirely complete. Finally, weigh the pan and its contents to determine the amount of water absorbed by the soil.

If the water content of the soil is divided by the dry weight of the soil and the result multiplied by 100, a value representing the field moisture equivalent is obtained. This percentage can be determined accurately for soils if it is 20 or greater. Soils with values lower than 20 are so coarse grained as to drain readily and therefore are practically always good subgrade soils. The field moisture equivalents of a large number of soils within the critical limits have been observed to be numerically equal to the clay contents of the soils expressed in percentages as determined by mechanical analyses. The field moisture

Classification of soils.

Class of soil.	% sand.	% silt.	% clay.
Sand	80-100	0-20	0-20
Sandy loam	50-80	0-50	0-20
Loam	30-50	30-50	0-20
Silty loam	0-50	50-100	0-20
Sandy clay loam.	50-80	0-30	20-30
Clay loam.	20-50	20-50	20-30
Silty clay loam.	0-30	50-80	20-30
Sandy clay	55-70	0-15	30-45
Silty clay	0-15	55-70	30-45
Clay	0-55	0-55	30-100

equivalent may be assumed, therefore, to indicate the percentage of clay content, eliminating the necessity for the more difficult mechanical analysis. The use of the field moisture equivalent as a

means of indicating the clay content and the desirability of soils for subgrade use is not claimed to be positive under all conditions, but it is significant in nearly all cases.

Generally speaking, soils with less than 20 % clay, i. e., sands, sandy loams, loams and silty loams (see accompanying tabulation) are considered to be good subgrade soils; soils with 20 to 30 % clay, including sandy clay loams, clay loams and silty clay loams, also sandy clays and silty clays are known as doubtful subgrade soils, while clays are considered as poor material for this purpose. Reconnaissance soil surveys may be made by the use of a U. S. Bureau of Soils map in connection with the tri-axial soil classification chart without the use of tests.

The drainage condition of a subgrade soil as well as its bearing power are poor when the actual moisture content of the soil exceeds its field moisture equivalent. Drainage in a broad sense involves both constant elimination of excess gravity water, and the prevention of the access of water to the mass under consideration. In the latter problem it is necessary to deal with lateral seepage or subsurface flow (in volume), vertical or lateral capillary action and direct access of water from rainfall.

Capillary water from below may be excluded by a layer of gravel or broken stone eight to ten inches in thickness. Laterally, it may be intercepted either by ditches or by gravel-back-filled trenches, which also may be used to intercept free water moving laterally. Cutoffs at right-angles to the track and extending beneath the ballast are often necessary and on down grades they will eliminate the necessity of considerable drainage of soft spots. Sometimes necessary support of the roadbed is removed by the movement of the ground away from a position below and near the roadbed, while in a cut such ground may threaten to overwhelm the roadbed from above. In either case it may be necessary to prevent the absorption of rainfall by oiling such surfaces.

Size of soil particles:

Grad	Millimetres.
Coarse material	more than 2
Fine gravel	2 to 1
Coarse sand.	1 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.1
Very fine sand.	0.1 to 0.05
Silt.	0.05 to 0.005
Clay	0.005 to 0.0

Drainage of open and impervious soils.

If the actual moisture content of an open soil (less than 20 % clay) exceeds its field moisture equivalent, it is an indication that the soil lies below the water table in a stratum bearing free water. Where this is due to surrounding or underlying impervious strata, the water table may be lowered by one of three methods as follows :

a) By an outlet through the surrounding material;

b) By drilling through the impervious bottom of the area to permit the water to escape through lower pervious strata, if such strata exist;

c) By placing sub-drainage pipe at such a depth as to lower the water table below the level of adverse effect. With this method an outlet is essential.

If the actual moisture content of a less pervious soil (more than 20 % clay) exceeds its field moisture equivalent, there is also free water present which should be removed by subdrainage. The lowering of the water table in such soils also tends to decrease the amount of capillary moisture near the subgrade surface. Some of the denser clays are so impervious as entirely to prevent the passage of free water through them and in such soils drain pipes are of no value. It is preferable to keep the water away from such soils in the first place, as they re-

tain extremely high percentages of capillary water.

Pipe drains.

Except in impervious soils, the efficient subdrainage of wet cuts and of saturated soil upon which embankments rest may be attained by the use of pipe drains. In cuts the main pipes should be laid parallel to and nine feet from the center line of the adjacent track. Along embankments the location should be about ten feet from the toe of the slope, thus keeping the pipe away from the zone of subsidence under the fill and outside of the deposit of sediment washed down the slope. The grade of the pipe should not be less than 0.2 % and preferably 0.4 % or greater where practicable. Where possible, mains should be laid on a uniform grade or with the grade increasing towards the outlet; where a reduction in grade is unavoidable, an adequate catch-basin should be provided.

The depth of the pipe may depend wholly on the level of the water source. A minimum depth of three feet below the bottom of the ditch or six feet below the subgrade in cuts or six feet below the natural ground surface along fills is recommended. Care should be taken to locate the pipe at such depths that no displacement will be made in the alinement or grade of the pipe by the subsidence of the roadway under traffic or by the action of frost. To this end the trench in which the pipe is to be laid should be dug down into a motionless stratum underlying the saturated material which it is desired to drain. Where this is impracticable some means of curing the situation other than by the installation of drainage pipe must be adopted.

The minimum inside diameter of pipe for main drains should be six inches. In long wet cuts the diameter of the pipe should be increased at intervals between the source and the outlet as the increasing flow demands, from 6 inches to 8 inches, to 10 inches, to 12 inches, etc., as necessary.

In extremely wet cuts, the mains alone may not be sufficient and laterals extending under the track may be required. These should be spaced from 10 to 40 feet apart, depending upon the character of the material to be drained. A minimum grade of 4 % and preferably 8 % (1 in 12) should be provided to prevent sedimentation. The maximum grade should be 16 % (2 in 12), as with greater grades there is danger of the lateral being forced into the main.

The pipe used should : 1, have ample strength to sustain safely the load and impact to be imposed upon it; 2. provide initially and maintain continually a high capacity for drainage, unimpaired by the separation of its unit or by the admission of soil or rock particles, and 3. have sufficient durability to insure a long service life with a resulting economy and freedom from interference with train operation because of renewals.

Kinds of pipe.

Two materials are available, each of which, if properly laid, fulfils these conditions. These are No. 1 vitrified clay sewer pipe with bell ends, and corrugated galvanized iron pipe with 1/4-inch perforations in the valleys of the corrugations (where the pipe diameter is least) and spaced 1 1/2 inches apart for 120° of the circumference.

The question as to which of these to use will depend on local conditions and on the relative costs. Vitrified clay pipe will usually cost less than corrugated iron pipe and is preferable where the excavation is of any considerable depth into firm material or where the water carries sulphur or other chemicals in quantities injurious to iron pipe. Corrugated iron pipe is preferable where the cover is shallow or the material is unconsolidated and where vitrified pipe might be subject to breakage or its alinement disturbed by accident or heaving.

The cross-section of the trench should be such as to prevent the permeable backfilling from being cut off through the temporary heaving of the roadbed before it becomes compacted through drainage. A bottom width of 18 to 30 inches is recommended, with the side opposite the track vertical and the side near the track vertical to an elevation such that a slope excavated at an angle of 45° will intersect the bottoms of the ties at their ends. The trench should be excavated to a depth of from two to four inches below the grade established for the outside surface of the bottom of the pipe. The soil removed from the trench should not be used for the pipe covering nor even deposited in the vicinity, but should be hauled away from the site at the time it is excavated. The bottom of the trench should be backfilled thinly with a selected permeable material to provide a firm surface at the correct grade as a foundation for the pipe.

Installation of pipe.

Commencing at the lower end, tile pipe should be laid with the bell end up grade, leaving the joints open to permit the water to enter. Corrugated iron pipe, which may be obtained in lengths in multiples of 2 feet up to 20 or 30 feet, should normally be laid with the perforations in the bottom with the inside circumferential laps pointing down stream. Laying the pipe with perforations down permits the greatest inflow of ground water with the least intrusion of sediment.

With either type of pipe, deep open-ditch outlets should be avoided by extending the pipe to shallow cover but not into the frost zone. The outlet ditch should be excavated well below the outlet on a heavy grade. The pipe outlet should be protected by a screen to prevent the entrance of animals into the pipe.

Risers should be placed at the upper end of each main and at intervals of 300 feet along the main to permit of flushing. The entire trench should be backfilled carefully with a selected permeable material, such as clean crushed stone or washed gravel. Engine cinders should be used only when no other satisfactory material is available, but never with corrugated iron pipe on account of the corroding effect of the sulphuric acid which is present.

Fig. 3. — Installing a drain where drainage is badly needed.

On new construction the drainage system should be completed before any track work is undertaken, if it is possible to get the pipe and backfill material to the work. A complete record should be kept of all drains, which should include a description of the kind, size, location and depth, so that they may be located easily when necessary. A yearly inspection should be made on all subdrainage systems to assure proper maintenance.

[625. 123 (.73)]

Burrow under fill to stop slides.

(Railway Engineering and Maintenance.)

More than 2 000 feet of 8-inch corrugated iron pipe, 500 feet of 36-inch pipe and 40 feet of 42-inch pipe were inserted in an embankment by either jacketing or tunneling, in addition to 1 500 feet of 12-inch pipe placed in trenches to serve as intercepting and out-fall drains, for the purpose of correcting the conditions responsible for a serious slide and subsidence on the Chicago, Milwaukee, St. Paul & Pacific main line near Mobridge, S. D. This project, which was undertaken after a thorough investigation of the cause of the unstable condition of the embankment, including the drilling of many test holes, comprises an excellent example of drainage work based on accurate knowledge of the conditions presented, and prosecuted along lines that would reach the seat of the trouble, regardless of the difficulties that these measures imposed. For example, most of the tunneling and packing was done from the bottoms of pits from 15 to 24 feet below ground level, from which water had to be pumped constantly to permit the work to go on. The pump in one of these pits delivered 15 000 gallons per day. Most of the work was confined to a track distance of 300 feet embracing the area subject to the most serious disturbance.

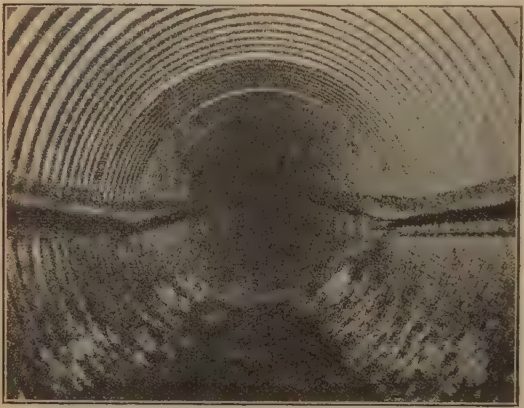


Fig. 1. — View inside of nestable 36-inch pipe assembled in a tunnel 60 feet below and directly under the track.

An old embankment.

The embankment involved is from 50 to 60 feet high within the limits of the longitudinal distance that imposed the principal difficulties. The natural ground surface at this point has a transverse slope such that the toe of the north slope of the embankment is from a few feet to as much as 20 feet higher than the toe of the south slope. In spite of the fact that the embankment rendered satisfactory service for many years and was presumed to have become thoroughly solidified, evidence of an unstable condition was noted in 1930. At that time several large cracks appeared in the surface of the fill and they increased in size as time went on, followed at intervals by slides at various places in the area affected — sometimes on one slope and at other times on the other.

As the settlement took place, the track was raised on sand and gravel, while the loss of section due to slides was made good by widening the roadbed with material from borrow pits, and by May 1931, it was found that the settlement accounted for in this way amount-

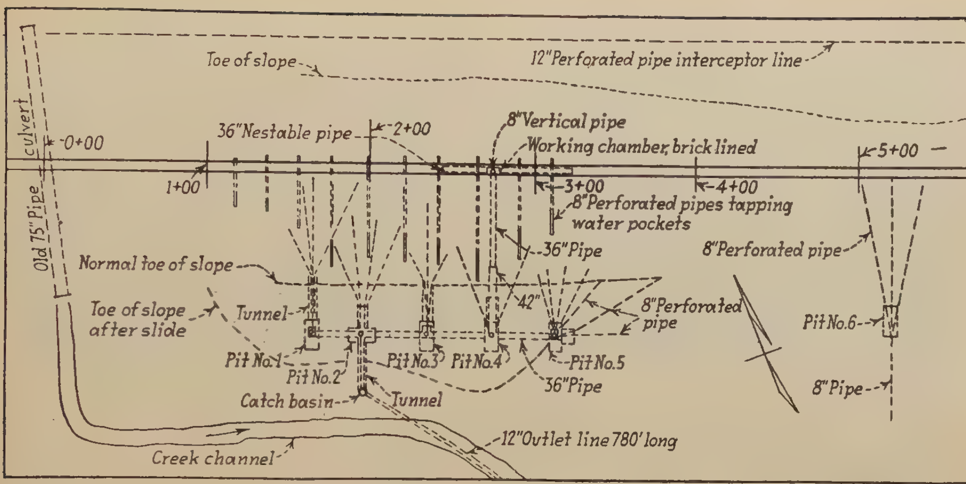


Fig. 2. — General plan of the drainage system.

ed to about 30 inches. Emergency protection being deemed necessary at that time, a line of 40-foot piles was driven on each side of the track for a distance of 180 feet, using 23 piles in the north row and 45 in the south row since the sliding was much more severe on the south side. A line of 8-inch by 16-inch stringers was bolted against the outside of each row of piles and the two rows were tied together at intervals of 8 feet by 1-inch steel rods that passed under the track. This work was completed on 6 June.

In spite of this, however, the movement of this part of the embankment continued, and three days later, early in the morning, 210 feet of the roadbed, embracing all of the part enclosed by the pile retaining walls and the upper

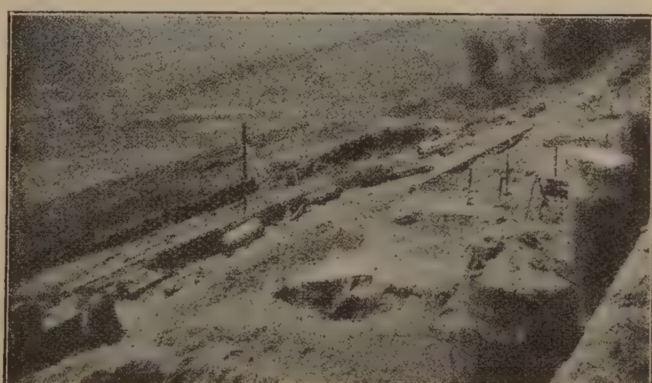


Fig. 3. — A view taken shortly after the slump and slide. — Note break in fill marking the south edge of the slump.

half of the south slope, slumped from 10 to 15 feet vertically and slightly to the south, breaking away from the north half of the fill on a cleavage plane coincident with the north line of piles. The south row of piling dropped down and moved several feet to the south with the fill, the tension exerted by the tie rods being sufficient to break off most of the piles in the north row about 15 feet below their tops. At the same time, pronounced heaving took place at the toe of the south slope, accompanied by the opening of large cracks in this bulged area.

Traffic was restored by driving a pile trestle of some 16 or 18 panels as quickly as possible, after which a thorough investigation of the conditions in and under the fill was undertaken for the purpose of arriving at a basis for a permanent and economical method of stabilizing the embankment. It was found that the soil at the site of the fill is a clay loam over a stratified clay that breaks up into pieces of various sizes and is very greasy to the touch. This material is found to a depth varying from 3 or 4 feet up to 15 feet and is underlain by a hard blue clay extending to unknown depths.

Composition of the embankment.

The fill, which was constructed from material taken from nearby cuts and borrow pits, is largely clay although layers of sand and sand clay were found near the base in a few locations, while the top 5 to 10 feet, was largely sand and gravel, much of which had been applied during the period of progressive settlement. It is apparent, however, from the large pockets of gravel found within the roadbed width, that large quantities had been applied as ballast to compensate for settlement in past years.

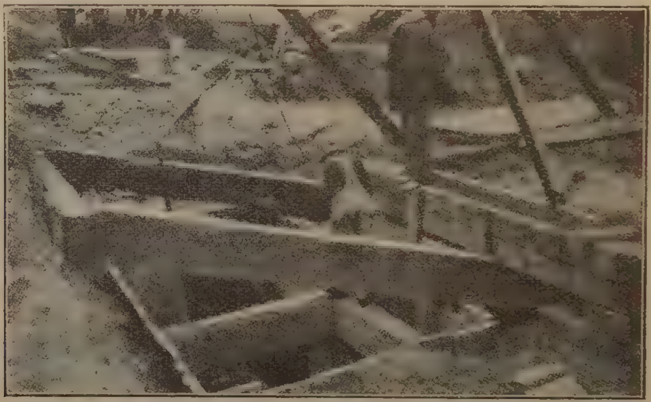


Fig. 4. — Jacking pit No. 2.

Investigation disclosed also that the ground-water level south of the fill was from 12 to 15 feet lower than on the north side, a condition favoring a ground-water flow from north to south. However, the conditions found were such as to point to water impounded in the pockets of pervious material under the roadbed as the primary cause of the trouble. Softening the clays, which have very little stability when wet, the water also reached cleavage planes between the subsurface strata and gave rise to a combination of slumping and sliding on the transverse slope of the south.

Based on this conclusion, it was de-

Fig. 5. — Traffic was handled across the slumped embankment on a pile trestle. Note the heaved material in the foreground.

cided that the most positive method of stopping the movement was to provide a drainage system for the removal of the water impounded in and below the fill and for the interception of the flow of ground water seeping through strata below the fill. This drainage system, as designed and installed, consists of three independent units, all of which were constructed of corrugated iron pipe.

One of these is a line of 12-inch perforated pipe 800 feet long laid in a trench beyond the toe of the north slope for the purpose of intercepting subsurface water and carrying it to a creek that is conducted under the embankment through a concrete pipe culvert just west of the location of the slump in the fill. Another unit of the system consists of a group of ten 8-inch perforated pipes that were driven into the embankment from the face of the south slope to tap the bottoms of water pockets from 16 to 26 feet below track level. These pipes are spaced from 20 to 25 feet apart and are from 37 to 73 feet long. The third and most elaborate feature of this drainage installation is a system of subsurface drains designed to release water from the strata supporting the fill, special pains being taken to follow numerous well defined cleavage planes so as to remove the water which had served to lubricate them.

This last named feature of the project involved several serious problems, for although this system consisted in the main of 8-inch perforated pipes that were forced into place by jacks, the desired location for these drainage lines was so far below the ground surface south of the embankment that both the jacking and provision for an adequate outfall drain introduced serious problems.

On a line 100 feet south of and parallel with the center line of the track, five pits, 8 feet wide by 18 feet long and spaced from 30 to 40 feet apart, were, therefore, excavated to a depth of from 15 to 24 feet below the surface or from 62 to 68 feet below track level. As all of these pits fell within the limits of the heaved material at the base of the slide, an unstable soil condition was encountered that gave rise to the use of heavily braced sheeting in the pits for their full depth, while the amount of water encountered was such as to require pumping until the outlet drain was completed, as described later. These pits served as the starting points for the jacking and

tunneling operations required for the construction of the drainage system, which consists primarily of 8-inch perforated pipes driven toward the center of the fill, following the cleavage planes as closely as possible. It includes also a 36-inch pipe connecting the five pits

Fig. 6. — End of the long outlet line on the south side.

and a 12-inch pipe extending 40 feet to the south from pit No. 2 to a catch basin, whence a 12-inch outfall line could be installed in a trench to an outlet in the creek bed, a distance of 1 200 feet to the south east.

The 36-inch pipe was installed by the jacking method now frequently employed in placing culvert pipe under old embankments, while the 8-inch pipe was placed by means of a small pipe-jacking machine. However, considerable tunneling was also done, for example, in placing the 12-inch pipe from pit No. 2 to the catch basin. Also, with the exception of the work at pit No. 5 from which seven 8-inch pipes were jacked in radial lines direct from the pit, tunnels were extended northward from 15 to 25 feet from the pits before the jacking of the 8-inch lines was started. These tunnels were timbered.

An extensive tunneling operating.

In all, 20 lines of 8-inch pipe were driven under the fill, their lengths ranging from about 40 feet to 90 feet. In addition, three lines, each 90 feet long, were driven from an independent pit, No. 6, located 200 feet east of pit No. 5, but in this case an 8-ich pipe driven south a distance of 50 feet afforded the necessary outlet for the water without any connection with the collection and run-off system provided for the other five pits. However, the most spectacular feature of the project was the operation carried on from pit No. 4.

Starting from this pit, a tunnel was excavated 15 feet to the north and from the end of this tunnel a 42-inch pipe was jacked in 20 feet where a reduction was made to a 36-inch pipe which was jacked north an additional 60 feet, or so that its inner end was directly under the track. Here a working chamber was excavated from which a 36-inch nestable pipe (delivered in semi-cylindrical sections with longitudinal flanges) was installed by tunneling for about 30 feet west and 45 feet east directly under the track. This longitudinal pipe line was then used as the chamber from which five lines of 8-inch pipe were jacked vertically up into the fill a distance of 13 feet, while at a point 38 feet to the south, in the 36-inch approach pipe to the longitudinal line, 8-inch lines were projected upward and to the east and west, for a distance of about 10 feet.

The excavation required for this extensive drainage system varied from work in soft sticky clay to hard shale. The spoil was hauled through the pipes

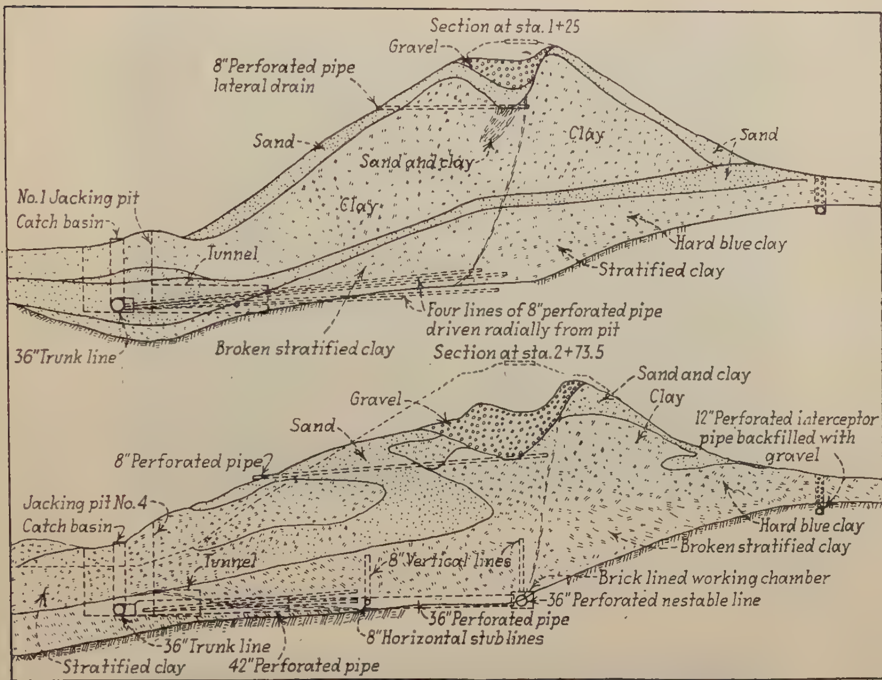


Fig. 7. — Two cross sections of the embankment showing conditions at the time the drainage system was completed but before the embankment was restored.

Fig. 8. — Looking west in the 36-inch collector line toward pit No. 1, showing the outfall ends of the three 8-inch perforated drain lines.

and tunnels in small skips that were moved on 18-inch gage pipe tracks to the pits, whence they were hoisted by small stiff-leg derricks equipped with hand-operated crabs. During the progress of the work it was noted that

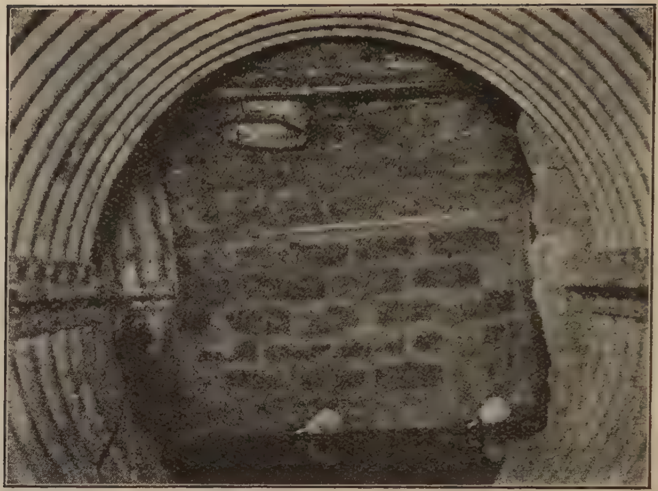


Fig. 9. — In the interceptor room where the 36-inch pipe under the center line or the roadbed connects with the lateral leading to pit No. 4.

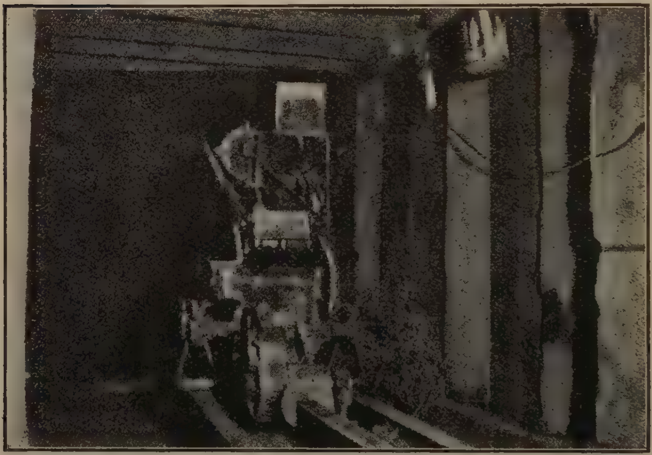


Fig. 10. — A view showing the boring and jacking machine used to drive the 8-inch perforated pipes into the fill.

pumping from the pits along the south toe of the slope was accompanied by a fall in the water level in a pond north of the fill about 1 000 feet east of the slide, the elevation of the water in the pond being about 18 feet higher than the elevation of the water table under the center line of the fill at the slide. On

the basis of this information, a line of 196 feet of 48-inch corrugated pipe was jacked through the fill to drain the pond, and insure that no further water could enter the slide area from this source.

The drainage work was started on the 2 October 1931, and completed on the 6 December, but owing to the frozen condition of the ground, completion of the backfilling was deferred until the 1932 summer. This work was done by train haul, the cars being dumped from the trestle that had been built across the gap in the roadbed formed by the slide, and after about 100 carloads had been placed, heavy settlement, together with evidence of an unstable condition down the slopes, led to a decision to suspend the train haul filling until a berm could be placed at the bottom of the south slope by team work.

This behavior of the fill gave rise to some question concerning the effectiveness of the drainage system, but a thorough examination made in September, of all drainage lines that could be entered by a man, disclosed no signs of distortion and showed that the system was functioning effectively. The discharge at the time of the inspection was 41.5 gallons per hour. Moreover, during June, following several days of heavy rain, the flow from the drainage system was 360 gallons per hour. As a further check three test holes were drilled from the top of the fill to a depth of several feet into the natural ground beneath and these were all so dry that it was necessary to introduce water to carry on the drilling.

Based on this investigation it was concluded that there was not enough water in the fill to have contributed in any way to the settlement, but that is was due to the closing up of the extensive voids that were formed by the breaking up and cracking of the fill during the course of the slide and of such voids that were left by the water as it was drained away.

Armco pipe was used throughout. The investigation and installation were made by the Drainage Engineering Company, Middletown, Ohio. The work was carried out under the direction of Arthur Daniels, district engineer for the Chicago Milwaukee St. Paul & Pacific at Minneapolis Minn., after plans had been approved by W. H. Penfield, engineer, maintenance of way.

[656. 253 (.42]

Speed signalling on the London Midland and Scottish Railway.

(From *Modern Transport.*)

An installation which constitutes one of the most important developments in British railway signalling was brought into service on the 17 July 1932, and has since been working with satisfaction to all concerned. We refer to the searchlight colour-light system now in operation at Mirfield, between Heaton Lodge Junction and Thornhill L. and N. W. Junction — a distance of 2 3/4 miles — on the London Midland and Scottish Railway (L. M. S. R.) main line north-east of Huddersfield. A preliminary description of this installation appeared exclusively in the 2 April issue of *Modern Transport,* and now, having had an opportunity, in company with Mr. A. F. Bound, the signal and telegraph engineer, London Midland and Scottish Railway, of inspecting the work and watching the operation of the signals by day and night, we are enabled to give more detailed particulars and impressions of this interesting achievement.

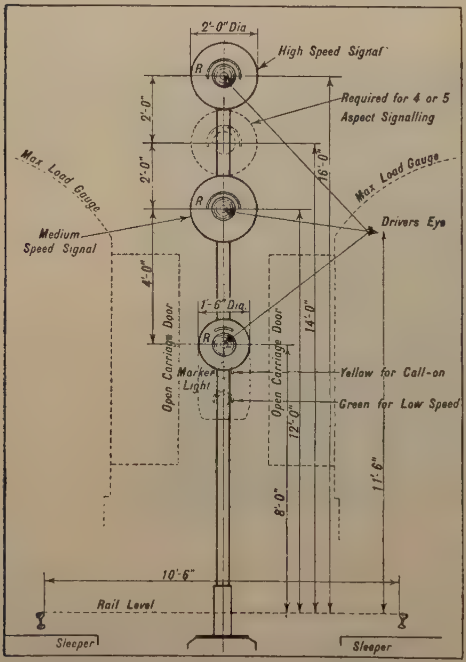


Fig. 1. — Typical arrangement of speed junction signal fixed in the space between two lines of way.

In the first place, it may be remarked that with the opening of a new marshalling yard for freight trains and the elimination of a « bottle-neck » three-quarters of a mile long at Mirfield, the London Midland and Scottish Railway have completed an important reconstruction scheme which will considerably improve the working of heavy freight traffic between Lancashire and Yorkshire and in the industrial north generally. The elimination of the « bottle-neck » through Mirfield, where four through lines are now provided instead of two, has involved engineering works of considerable magnitude, including a viaduct of seven girder spans, with a total length of about 170 yards, to carry the railway across the River Calder, a mill « goit » and three roads, near Mirfield station.

To improve the working of goods trains there have also been provided two new arrival lines with a total capacity of 120 wagons, a group of twelve sidings with a total length of 2 1/2 miles, sufficient to hold 620 wagons, and a new wagon repairing depot, whilst for the supply of water to locomotives an artesian well has been sunk and a new pump-

house built to feed two concrete tanks of 20 000 and 4 000 gallons capacity respectively.

Attention is drawn to these engineering details in order to emphasise the fact the the new signalling installation was not primarily intended as a means of economising in the number of cabins, although this feature was carefully considered, having regard to the work to be performed. On the other hand, it was regarded as a favourable location — with its complicated junction working and increased traffic movement following the widening of the lines — for the application of the principles of speed signalling, which, incidentally, were reviewed in a paper read by Mr. Bound before a joint meeting of the Institute of Transport and the Institution of Railway Signal Engineers, and published in abstract in the issue of *Modern Transport* for 19 March 1932.

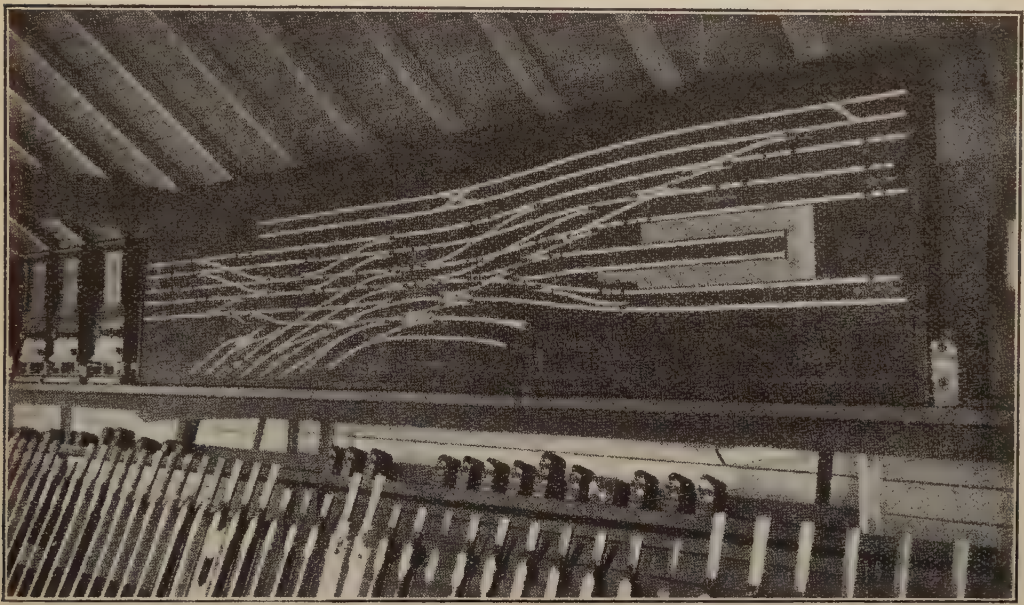


Fig. 2. — Illuminated diagram, Mirfield No. 3 cabin.

General arrangement.

From Heaton Lodge Junction to Thornhill L. and N. W. Junction, *i. e.*, throughout the colour-light area, all the lines have been track-circuited. In view of the multiplicity of junctions, block working has been retained between cabins, the standard London Midland and Scottish Railway « Class C. » type being employed. This interlocks with the relative signal levers, but in this instance is free of track circuit control as the latter is continuous and itself exercises a direct control on the various signals. The signals are operated from the respective signal cabins and controlled by the tracks.

The opportunity has been taken to introduce « speed » signals in the numerous instances where trains can be diverted on to alternative tracks following the same alignment as the main track.

This is in contradistinction to « route signalling », the aim being not so much to indicate to the driver the route he is to take as to show the *relative* speed at which he is to travel over it, and this latter indication is given by the relative position of the « Proceed » aspect on the signal post.

Multiple-aspect signalling.

Three-, four- or five-aspect signals are employed in this installation, their use depending upon the spacing of the signals ahead and the braking distance required. Each signal, other than those at junctions, normally displays two red lights — one 12 feet and the other 8 feet

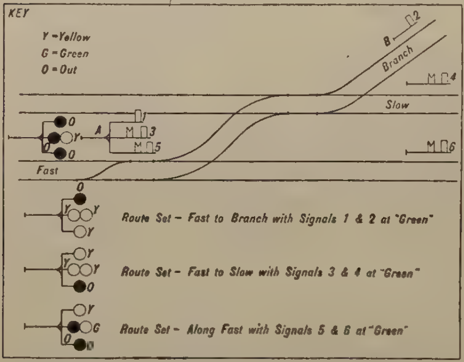


Fig. 3. — Sketch showing implication of distant signal aspects at a typical junction.

above rail level. The upper light is a multiple-aspect colour-light signal of the searchlight type, capable of displaying a red, yellow or green light; the lower light is the marker (see figs. 1 and 5*a*). The lower light indicates to a driver that he is in a multiple-aspect signalling area, and can also be used as a low-speed signal. These marker lights are placed vertically below the top light, except in the case of automatic signals, where they are placed 10 inches to the left of the vertical, giving a staggered effect, of which however, there is no example at Mirfield. Except when used in connection with junction « speed » signals, the marker light is extinguished when the colour-light signal above it is changed to green, but when the latter is changed to yellow the marker light remains illuminated.

This appears an eminently logical and satisfactory arrangement, because the extinguishing of the marker when the main signal shows green obviates the possibility of a driver interpreting green-red for « home off, distant on », as in mechanical practice. Also, observation shows that the use of the red in conjunction with yellow is very valuable in helping a driver correctly to distinguish the latter, whilst the two in combination are most arresting as a cautionary signal. Moreover, wherever a signal may be situated and whatever its type, so long as it is showing green alone the driver knows he has a clear road, without any qualifications.

Junction speed signals.

At a junction the arrangement of signal aspects is as follows :

Where permissible speeds over alternative routes vary by 20 or more miles per hour, the aspects are given by vertical instead of horizontal displacement, as in figs. 1, 5*b* and 5*c*.

Normally three red lights are displayed vertically on each junction signal post. The top light is for the high speed route; the centre light is for the medium speed route; and the bottom light is for the low speed route; the three giving the undermentioned implications :

High speed is the highest permissible speed at any given location.

Medium speed is the restricted speed suitable to the diverging route.

Low speed is shunting speed.

The high and medium speed signals operate on the multiple-aspect principle, being capable of exhibiting a red, yellow or green light. The low speed signal does not operate on the multiple-aspect

principle, but it can be changed to yellow or green according to the state of the line ahead. The yellow and green lights of the low speed aspects are of short range, and are half the size of the normal lights (fig. 5*c*).

At junctions where the permissible speeds over alternative routes vary by less than 20 m. p. h., the junction signal aspect is given by horizontal displacement, as in semaphore signalling (fig. 5*d*). Distant signal aspects with horizontal displacement are provided for junction home signals where necessary. The application of these principles is shown in figures 3 and 5*e*).

Meeting varied requirements.

Where the braking distance between consecutive signals ahead demands a double yellow, the additional yellow is exhibited between the high and medium speed aspects on a junction speed signal, as in figure 1, and above the « searchlight » signal on other signals (see figs. 5*b* and 5*a*).

In certain cases the braking distance on high-speed routes demands a fifth aspect, given by displaying a green aspect below the yellow, this being of considerable value in keeping heavy mineral trains moving at their highest speed as drivers know they will have ample warning should the need to stop arise.

The call-on signal is given by a small yellow aspect below a red, and this is brought about by the marker light going out and the small yellow appearing in a position immediately below that previously occupied by the marker light. Although the lever operating the marker. light from red to small yellow is free to be pulled at any time, the light does not change until the approaching train reaches a point approximately 100 yards from the signal when by the action of track circuit this occurs automatically, thus relieving the signalman for his other duties whilst ensuring the correct operation of Rule 43.

As the exhibition of the small yellow signifies the road ahead is occupied, whereas the small green indicates clear for a movement at low speed, where there is no track circuit for use as a selecting medium, a plunger is provided in the cabin and only after the signalman has pressed this is it possible for the small green to be displayed, the use of the plunger cutting out the control by the approach track already referred to, so obviating a heavy coal train being brought practically to a standstill with possible difficulties in restarting.

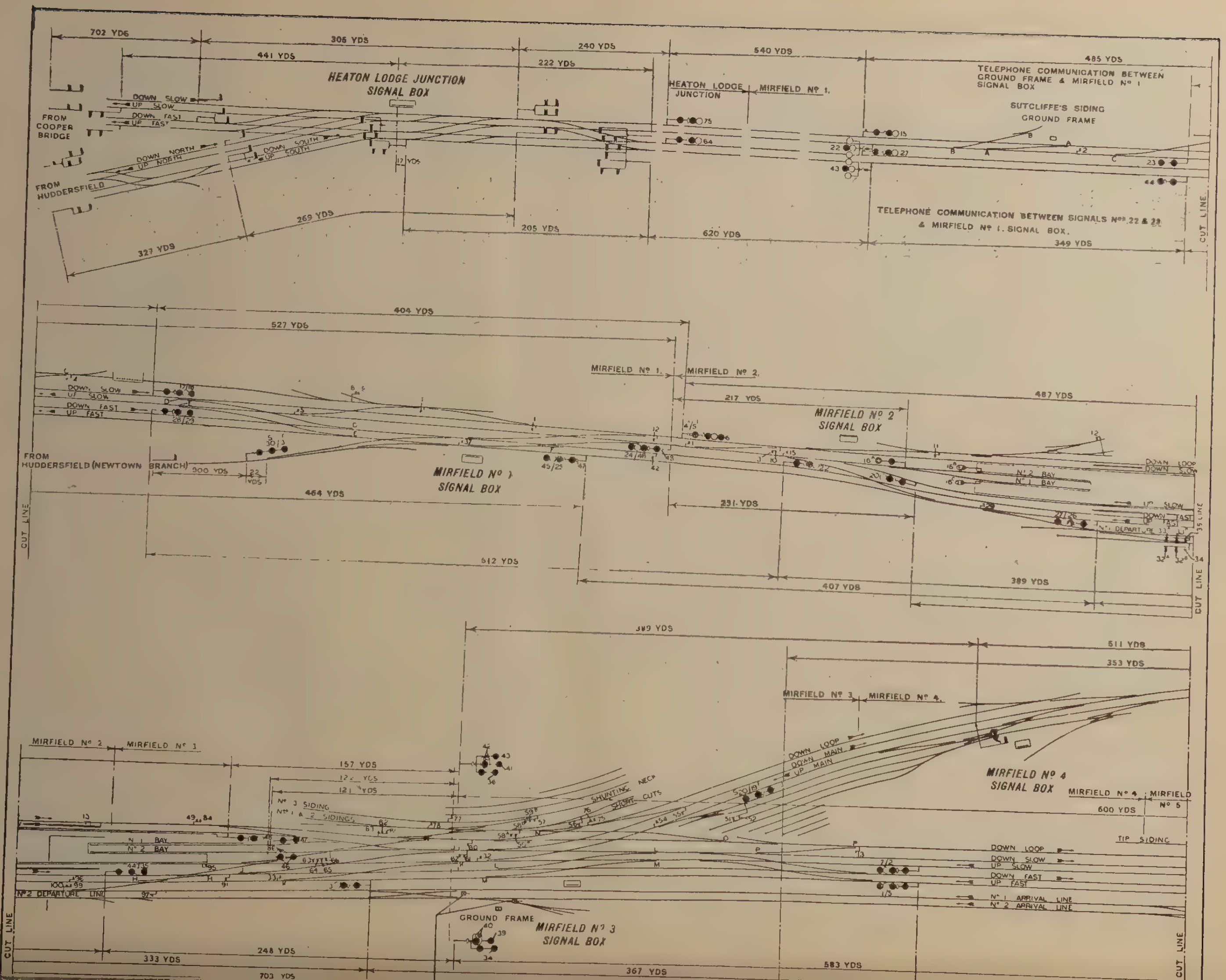
The signals are carried on a tubular post secured to a concrete block, the high, medium and low-speed aspects being 16 feet, 12 feet and 8 feet respectively above rail level. The whole structure is very compact and can easily be located in the « ten-foot », as shown in the illustrations.

The « Searchlight » signal.

The searchlight signal embodies the use of a miniature spectacle carrying the three colours (green, red and yellow) inside the body of the signal, operated on the principle of a polarised relay, the hue being given by the interposition of the required colour screen near the focal point of the lens combination. This prevents any possibility of a false phantom indication by extraneous light, and permits the use of a reflector system, whereby a beam candle power up to 50 000 can be obtained. In consequence, it is anticipated that the services of fog-signalmen will not be required.

Optical construction.

The optical construction of the searchlight signal is of especial interest. A concentrated filament lamp is so arranged that its filament is at the focal point of an elliptical reflector, which, collecting a large percentage of the light rays emitted from the lamp, concentrates and projects them at the second focal point of the reflector. At this second point,



HEATON LODGE JUNCTION SIGNAL BOX
FROM COOPER BRIDGE
FROM HUDDERSFIELD
DOWN SLOW
UP SLOW
DOWN FAST
UP FAST
DOWN NORTH
UP NORTH
DOWN SOUTH
UP SOUTH
HEATON LODGE JUNCTION
MIRFIELD Nº 1.
TELEPHONE COMMUNICATION BETWEEN GROUND FRAME & MIRFIELD Nº 1 SIGNAL BOX
SUTCLIFFE'S SIDING GROUND FRAME
TELEPHONE COMMUNICATION BETWEEN SIGNALS Nos. 22 & 23 & MIRFIELD Nº 1. SIGNAL BOX.
CUT LINE
702 YDS
305 YDS
441 YDS
240 YDS
222 YDS
540 YDS
485 YDS
269 YDS
327 YDS
205 YDS
620 YDS
349 YDS
FROM HUDDERSFIELD (NEWTOWN BRANCH)
MIRFIELD Nº 1 SIGNAL BOX
MIRFIELD Nº 2 SIGNAL BOX
MIRFIELD Nº 1.
MIRFIELD Nº 2.
Nº 2 BAY
Nº 1 BAY
DOWN LOOP
DOWN SLOW
404 YDS
527 YDS
217 YDS
487 YDS
464 YDS
512 YDS
231 YDS
407 YDS
389 YDS
MIRFIELD Nº 2
MIRFIELD Nº 3
MIRFIELD Nº 3 SIGNAL BOX
MIRFIELD Nº 4 SIGNAL BOX
MIRFIELD Nº 4
MIRFIELD Nº 5
GROUND FRAME
Nº 3 SIDING
Nº 1 & 2 SIDINGS
SHUNTING NECK
SHORT CUTS
DOWN LOOP
DOWN MAIN
UP MAIN
TIP SIDING
DOWN SLOW
UP SLOW
DOWN FAST
UP FAST
Nº 1 ARRIVAL LINE
Nº 2 ARRIVAL LINE
Nº 2 DEPARTURE LINE
Nº 1 BAY
Nº 2 BAY
157 YDS
121 YDS
511 YDS
353 YDS
600 YDS
248 YDS
333 YDS
703 YDS
367 YDS
583 YDS

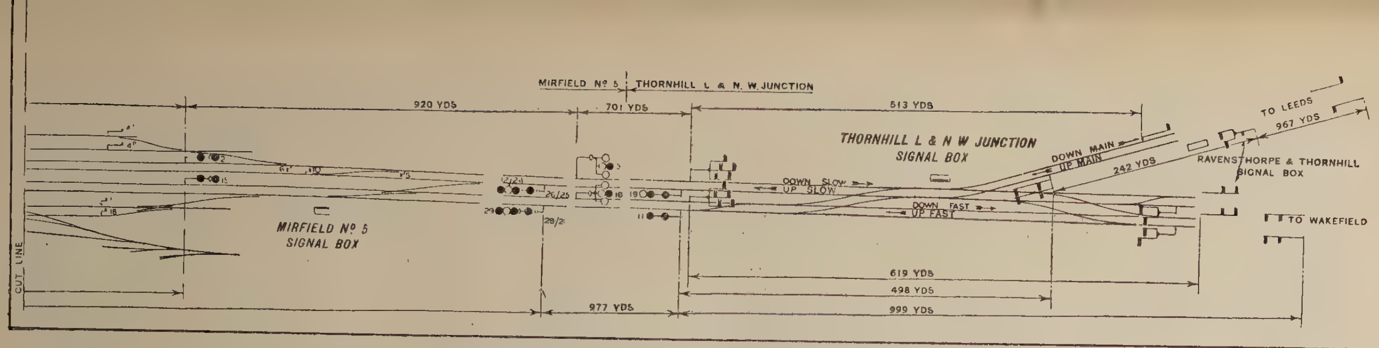


Fig. 4. — Diagram showing arrangement of colour light signalling, Mirfield, London Midland and Scottish Railway.

Fig. 5. — Typical signals in the new installation: (A) Ordinary type of signal for straight road, showing: top — yellow for fourth aspect, normally out; middle — searlight signal giving R/Y/G; bottom — marker light, red. (B) Junction speed signal, used where alternative speed over diverging route varies by more than 20 m. p. h.: it is capable of giving up to five aspects on high speed route and up to four on medium speed route. (C) as (B), with the addition that the marker is a low-speed signal capable of showing yellow or green according to the state of the line ahead. (D) Junction signal, used where alternative speed over diverging route varies by less than 20 m. p. h. The left-hand doll, when displaying yellow, is the colour-light equivalent of a distant signal leading to a mechanical home signal, and therefore carries no marker light. The small yellow and green on lower left of the centre doll apply to a permissive loop on left of down slow line (see No. 3 cabin). (E) Starting signal with directing distant aspects.

which is coincident with the focal point of a clear lens system, the light rays pass through a miniature colour disc, fill the lens and emerge in a coloured beam. Three of these miniature colour discs are supported by the moving member of a three-position relay, the position of the relay determining the colour of the disc through which the light passes—hence the colour of the signal indication. Under this arrangement approximately 80 % of the light emitted from the lamp is collected and produces a beam of exceptionally uniform intensity.

It is found that this development, in combination with the optical construction employed, has made this type of colour-light signal economical for use with primary batteries, since a 3-watt 4-volt lamp produces an indication of 11 000 beam candle power. Further, by using a lamp which consumes only 12 watts of energy, an indication of 37 500 beam candle power may be produced, and thus a very brilliant and powerful unit in colour-light signalling becomes economically possible. By projecting three indications from one lens, through the use of one lamp, a multiplicity of lenses and lamps is avoided, with consequent economy and constant check on the ability of the signal to give its most restrictive indication. Additionally, as all the light which can enter the signal from the outside must pass through the colour disc, there is no possibility of phantom indications, and it was of interest to note that with a bright sun low on the horizon and shining direct into the lenses of the signal shown on figure 5*d* the light was perceptibly intensified.

Considerable ingenuity has been employed to deflect a part of the main beam in such a manner as to afford continuity of vision by the driver as he approaches the signal, this being effected by the use of a hot-strip lens and the arrangement of parallel prisms moulded on the inner surface of the lens to divert a part of the light sideways and downwards. In addition, a roundel is used in combination with the hot-strip lens, being mounted in front of the latter by means of an adapter, and having a smooth convex outer surface with parallel flutes moulded on half the inner concave surface so as to deflect a part of the main beam to one side through an angle of 20°. This, in general, is the principle employed, but various lenses and roundels are used in combination to meet different circumstances of signal location.

Signal and point repeaters.

All colour-light signals, and points fitted with electrical detectors, are repeated in the cabin from which they are controlled. The indications are given by small 12-14-volt 3-watt lamps fixed behind coloured lenses. These repeaters are fitted behind the levers to which they apply, as shown in figure 2. The point indicator is a red light which only appears when the points are out of the normal or reverse positions, are not properly bolted, or are in opposition to the lever due to a broken point rod.

The « proceed » aspects of all searchlight signals are indicated in the cabin. The normal or red aspect is not indicated except where no marker light is used and the signal is out of sight of the signalman. A normal checklock circuit indicates the correct operation of the searchlight signals to normal.

Marker lights, and those lamps which are normally out and only display one aspect, such as the second yellow light in a four-aspect signal, are not repeated, but are fitted with double filament lamps. The yellow and green aspects of low-speed signals are indicated in the cabin.

There are seventy-four track circuits, varying in length from 30 yards to 900 yards. These are all of the alternating current (phase-controlled constant-current) type, and the feed apparatus and

the relays are in the majority of cases housed in buildings adjacent to, or forming part of, the signal boxes.

Power-operated points.

There are two pairs of power-operated points controlled from Mirfield No. 1 signal cabin. The machines are of the British Power Railway Signal Company's 110-volt alternating current type. Provision is made for operating the machines by hand in the event of a failure. The locking is so arranged that when any signal leading over these points is pulled off, the crank handle cannot be obtained, and also the removal of this handle locks all such signal levers in the normal position.

No lifting bars are provided at facing points, protection being given by track circuits extending wherever possible about 50 feet in rear of the points. The point levers are locked in the normal and reverse positions by these track circuits, the lever locking being detected by the relative signals.

Power supply.

Power for operating this installation is obtained from two separate substations of the Yorkshire Electric Power Co., Limited, at a pressure of 400 volts *A. C.* A hand-operated switch is fixed in Mirfield No. 2 cabin for changing over from one supply to the other, if necessary. From the signal box current is carried by twin-armoured cable at 400 volts to each cabin between Heaton Lodge Junction and Thornhill L. and N. W. Junction.

The current is transformed down to 110 volts at each cabin, the transformers and switchgear for each box being supplied by the British Power Railway Signal Company. From each cabin current at a pressure of 110 volts is taken by rubber insulated twin cables to cast-iron distribution boxes. This current is used for point indication relays and for feeding the local coils of the searchlight signals.

Each signal box is equipped with an indicator, which shows a green light when the plant insulation is normal, but if there is any leakage through faulty insulation the green disappears and is replaced by an upper or a lower red light, corresponding respectively to positive or negative earth.

Conclusions.

Our outstanding impression, after visiting the Mirfield installation, is that the principles enunciated by the Company's signal and telegraph engineer in the paper previously referred to are fully substantiated. We have already alluded to the efficacy of the marker light. As to the system of speed signalling, its advantages are nowhere more apparent than in its application to the working of double cross-overs. In every case in which a train is being diverted from one road to another the driver receives not only a prior warning of this movement, but also an indication as to whether the appropriate signal in advance is « on » or « off ».

We were impressed by the extraordinary simplification achieved by the application of colour-light signalling to a complicated layout such as Mirfield. Standing in the largest cabin, No 3, one is only conscious of three signals : No. 3 at one end applicable to the up fast line, and Nos. 2 and 15 at the other end, nearly 500 yards away, and worked from No. 5 cabin. With semaphore signalling, at any rate in day-time, and to a limited extent at night, up and down signals are equally noticeable and a mental process of selection has to be made. This is definitely absent with colour-light signalling and, in conjunction with more even spacing, brought about by considerations of braking distance, so essential in multiple-aspect signalling, the task of a driver in picking out his relative signals appears to be considerably simplified.

As to the searchlight signals, in sunlight they show up exceptionally well,

and in darkness they are extremely brilliant, thus giving under all conditions the finest possible indication to the driver. Other advantages attach to the searchlight signal : For instance, as three indications are projected through one lens, it is possible to get the beam of light directly into the driver's line of vision. Incidentally, the « site-ing » of signals — a somewhat perfunctory process in the past — is now reduced to a fine art; the London Midland and Scottish Railway use a periscope, which gives the same effect as observation from the footplate, and also a visibility meter for ensuring equal values for lights used in combination.

The signal also gives a powerful long-range indication on a low-energy consumption. Its relay simplifies and enhances the safety of light signal control, because the control of the speed indication is broken through a contact on the relay of the signal ahead, instead of through a separate control relay, whilst at interlockings indication of satisfactory operation is obtained through a contact on the signal relay itself instead of through de-energised contact of a separate control relay.

Thus, in the event of a failure of any given light, arrangements are made which ensure that it is not possible for a less restrictive aspect to be given; e. g., in the ordinary simple case of a three-aspect signal, the field coil is in series with the lamp, so that, if the latter fails, the field coil is thereby bound to be de-energised. Consequently, the mechanism reverts to the normal position, and the contacts operated by the mechanism ensure the correct relative sequence being displayed by any signals on the approach side, i. e., a yellow aspect would be automatically shown on the signal next in rear of that in which the lamp had failed. Incidentally, this elimination of auxiliary control relays leads directly to economy in first cost and maintenance.

Reference is also necessary to the new and excellent type of illuminated diagram which is provided in Mirfield Nos. 1, 2, 3 and 5 signal boxes. This is in the form of a light metal box, the front of which consists of a dark sheet-metal plate upon which the track and signals are painted, as shown in figure 2. The feature of the diagram is that no lights appear unless any of the track circuits are occupied, in which case indication is conveyed by red spotlights on the route concerned, two such lights being used for each track circuit. At the time of our visit the signalmen were unanimous in their approbation of this type of diagram, presumably because it is absolutely devoid of complications. The white lines and lettering show up well in a dim light at night-time, and the red lights are easily distinguishable, for the simple reason that they are the only lights on the diagram. Apart from this advantage, there is the important one of economy, which is obtained by reason of the fact that current for the lamps is only consumed during the occupancy of the various tracks. This type is undoubtedly a distinct improvement on the old, and we imagine that it will set the mode for the future.

We mentioned at the outset that the installation was not intended as a means for the amalgamation of boxes. Nevertheless, it has been possible to dispense with one cabin, despite the fact that twenty new junctions and cross-over roads have been provided. Two hundred and forty-two levers are involved in the new installation, as compared with 195 in the old.

In any signalling scheme and with any system of signalling, the man primarily concerned is the operating superintendent, and we feel that to Mr. C. R. Byrom, the chief general superintendent, London Midland and Scottish Railway, congratulations are due for his foresight and courage in instituting, in conjunction with Mr. Bound, a system of signal-

ling which in many directions is a complete breakaway from ideas hitherto prevalent in England, forming, as it does, a laudable attempt to forecast requirements for the future in connection with the application of colour-light signalling, whatever the conditions that may have to be met.

The whole of the mechanical signalling work, including the erection of cabins and relay huts, also the provision of cabling, block and telephone equipment, was performed by the railway company's forces, whilst the provision of all searchlight and other colour-light signals — the former of a special and highly efficient type — together with all track circuits, illuminated diagrams, locks, contactors, indicators, etc., was the work of the British Power Railway Signal Co., Limited, of 3, Central Buildings, S. W. 1. The installation was carried out to the designs and under the general supervision of Mr. A. F. Bound, signal and telegraph engineer, London Midland and Scottish Railway, the immediate responsibility for its execution devolving upon Mr. W. R. Jones, divisional signal and telegraph engineer, Manchesster. To Mr. Bound we are indebted for permission to visit the site, and to that gentleman and his assistants we would express our deep appreciation of many courtesies and help extended to us in the preparation of the foregoing description.

[**656. 255** (.73)]

A new centralised traffic control installation.

(*The Railway Gazette.*)

In connection with the new Dayton (Ohio) Union station, track elevation and other improvements, the Dayton Union Railway, comprising the five lines which enter Dayton Union station — the Baltimore & Ohio; Cleveland, Cincinnati, Chicago & St. Louis; Dayton Union; Erie and Pennsylvania Railroads — recently introduced a new type of electric interlocking which is of interest, first because of the simplicity of the control machine and circuits, secondly, because the control limits extend three miles and, thirdly, because of the interlocking consolidation in which five plants have been combined in one. The interlocking system is commonly designated in the United States C. T. C. interlocking because the control machine and circuits are of the type used in Centralised Traffic Control and for various C. T. C. remote control installations. The limits of the new plant are shown in the diagram, figure 3. All train and shunting movements in this territory are now handled by one director and one operator for each eight-hour shift, from one control machine at Union station. Contrary to the usual practice the director sits at the control machine and manipulates the levers because he can do so more easily and quickly than he can transmit his instructions to another.

The same territory was formerly handled by five interlocking plants and a total of 39 men daily, directors, operators, levermen and switch tenders, whereas the new plant is handled by six men daily, three directors and three operators, with geater ease and less confusion and delays than under former conditions. Traffic consists of through passenger and freight trains on all lines in both directions, heavy transfer movements between the yards of the several lines, passenger shunting movements at Union station to add or remove

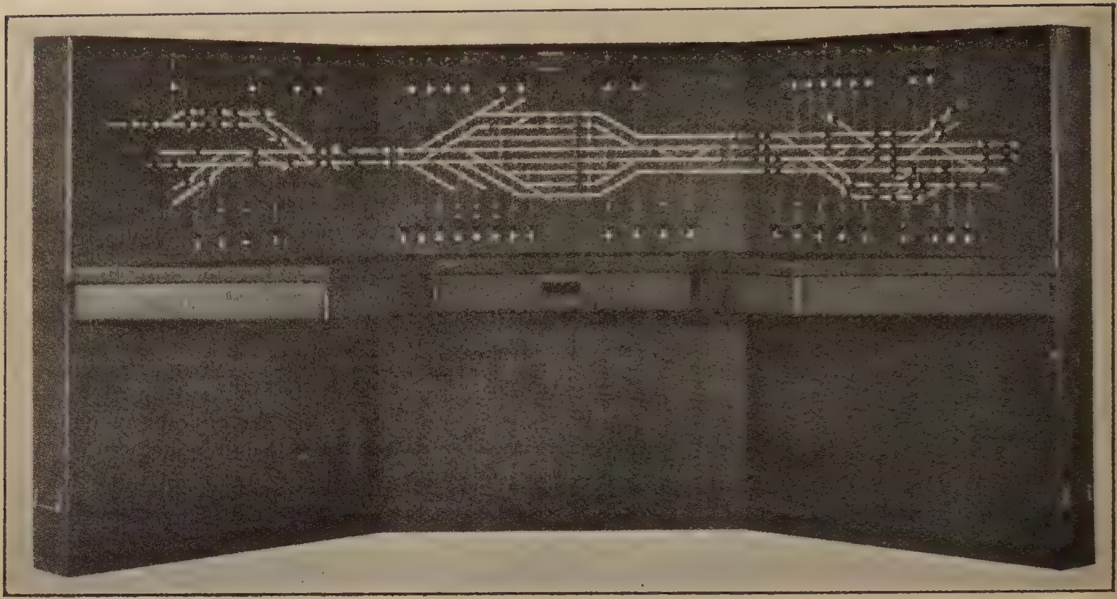


Fig. 1. — The control machine.

diners, sleepers and other cars, and shunting on various industrial sidings. In normal times there are over 250 traffic movements, but at present there are only about 150 movements. The switches of a number of the industrial tracks and tracks used infrequently are equipped with electric locks which require trainmen to communicate with the director and secure his permission and unlocking before such switches can be used.

As shown in figures 1-6, the control machine comprises a desk on which is mounted a control board consisting of a panel of insulating material made up in sections on which appears a diagram of the track layout. Tracks are represented by grooves 1/16 inch deep and 3/16 inch wide painted white to afford a good contrast to the black panel. A typical section of the control board is shown in figure 2. Track switches on the diagram are represented by movable points, known as point indicators, which are

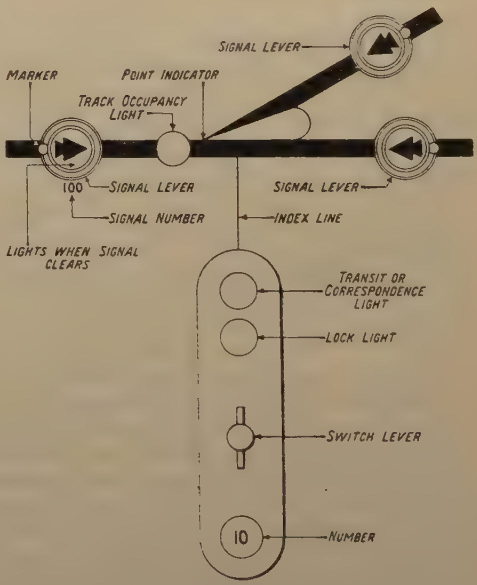


Fig. 2. — Typical section of control board.

controlled by, and correctly indicate the actual position of, the respective switches so that the operator can see at a glance if a route is properly lined up. For each switch there is a switch-lever unit, as shown in figure 2, which is located above or below its respective switch on the diagram, and an index line shows clearly which switch each unit controls. The switch lever is a small finger lever which has a vertical movement and actuates a pair of independent snap contacts. At the top of the switch-lever units is a yellow correspondence light, which is lighted when the switch is being operated or whenever the positions of the lever and switch are not in correspondence, and a red lock light which is lighted when the switch is not free to move on account of the electric locking.

The signal lever, as shown in figure 2, comprises a rotating knob, located on the track over which it governs, actuating two normally open contacts. One is closed when the knob is turned through 90° to the right and the other when 90° to the left. The arrow is stationary, and the glass around it is illuminated when the signal clears. The marker moves with the knob : at the top for clearing high or medium-speed signals and at the bottom for clearing low-speed or call-on signals. Traffic levers of the same general design as the signal levers, except that the arrow rotates through 180° with the knob, provide an auxiliary means for determining and indicating traffic direction through intermediate sections between interlocked groups. For each track-circuit section on the diagram there is a track occupancy light which is illuminated whenever the section is occupied by a train, locomotive or cars.

There is no mechanical locking between switch and signal levers as the locking is accomplished electrically by means of relays and interlocking circuits.

The chief advantages of the C. T. C. type of control machine are as follows :

1. There is practically no limit to the number of controlled switches and signals nor to the territory included.
2. The simplicity and small size of the control machine, also the ease and speed of manipulating levers within easy arm's reach make it possible for the director to sit at his desk and control all switches and signals in an extensive territory.
3. The control board affords a graphic picture of the track layout, the position of switches and signals and the occupancy of any track circuits, so that the director has available at all times the necessary information to enable him to direct all train movements easily and quickly.

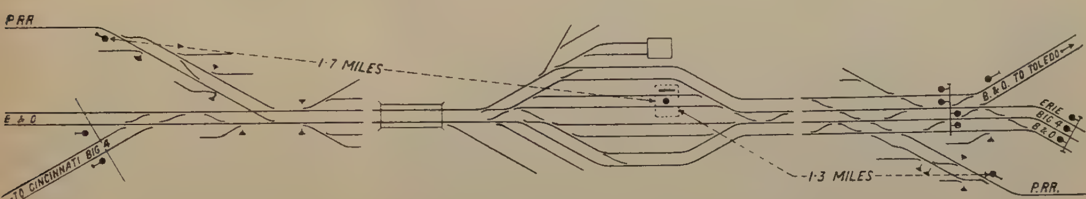


Fig. 3. — Track diagram showing extent of installation.

As shown on the control board, figure 1, the plant comprises three main groups of switches and signals : One group at and in the vicinity of Union station, one group at the east end and one at the west end. The group at Union station is directly controlled from the control machine and relays at that point,

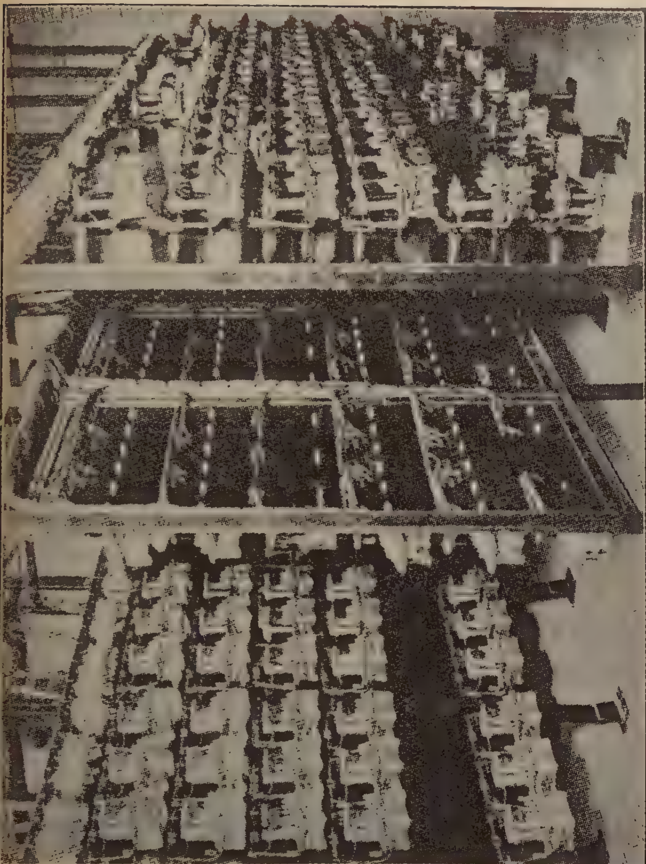
Fig. 4. — Typical signal bridge.

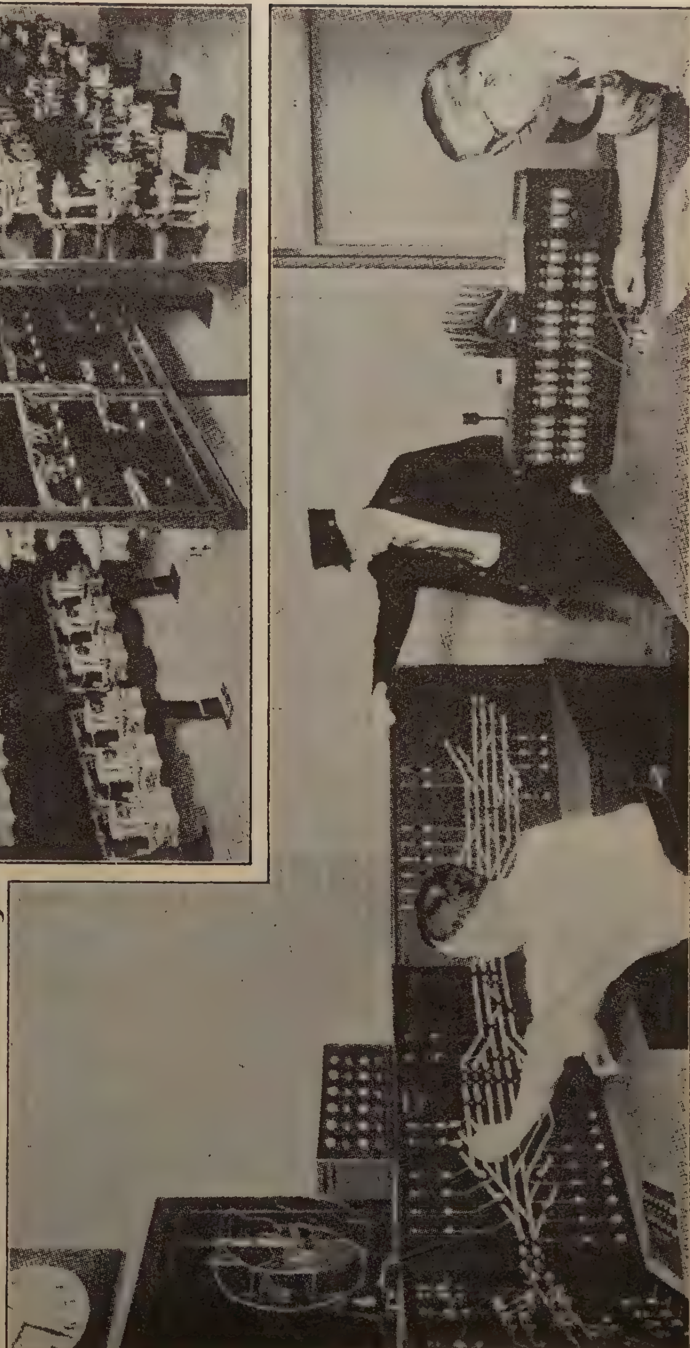
while the east and west groups are remotely controlled, and the relays for each group are installed in a sub-tower from which the operating wires run to their respective functions. The method of mounting the relays is shown in figure 5.

Normal and emergency power equipment in the form of 110-volt, 20-volt and 10-volt storage batteries charged by rectifiers, a d.c.-a.c. motor generator and a gas-engine generator is provided at each of the sub-towers also at Union station to serve the functions in the respective groups. 110-volt switch machines, and all 10- and 20-volt control circuits, are operated by direct current; the position-light signals are normally operated by alternating current in connection with 110 to 10-volt transformers and, in emergency, from one of the a.c. generators. Energy for each track circuit is supplied by one cell of storage battery. In emergency the entire plant can be operated from its independent power equipment and is, therefore, not dependent upon the normal, commercial a.c. power. All wires throughout the plant are in underground cables, Parkway cable buried in the roadway being used in all cases except through the platforms at Union station where lead-covered cables are run in conduit.

Control circuits.

The control circuits employed in the Dayton plant represent the very latest developments in the field of C. T. C. interlocking. The first consideration has been in the interest of safety. Every effort has been made to ensure proper co-ordination of functions not only in connection with regular operation, but also when unusual occurrences take place. Another outstanding feature of the installation has to do with the circuit means employed to remotely control and indicate the remote or sub-towers with a minimum number of wires. This





Right : Fig. 5. — View of the relay racks.

Below : Fig. 6. — Director at control machine.

problem was made easier by the fact that the means for co-ordinating the functions is at the sub-tower instead of at the control point as has usually been the case in the past. Thus the controls from the control machine do not involve safety and the indications are for information only and are not needed for checking purposes.

Two wires with a common return are employed between the control machine and sub-tower to control and indicate a switch or crossover. One of these wires controls the switch and indicates when the electric locking will not permit the switch to respond to the lever. The other wire indicates whether the switch is in one position or the other or if it is in midstroke. A combined usage of the two wires indicates track occupancy of any one track circuit in which the switch or crosscover is located. One wire with a common return is used to control each signal, one polarity giving a high or medium speed signal and the other polarity giving a low speed or call-on signal. One wire is sometimes used to indicate a single signal but more often it indicates several conflicting signals. The purpose of the signal indication is to afford a means whereby the train director can check his own work to determine that he has set up a complete route and that the signal is clear, thus avoiding train delay in case he overlooks some requirement. The 110-volt d. c. which operates the switch machines is distributed on buses of that voltage to the various machines, whilst 110-volt a. c. serves the position light signals from their respective control relays and 110/10-volt transformers are located at the signals.

It is interesting to note that the signals in this installation are neither of the semaphore nor of the colour light type but of the three-aspect position light pattern. In it three white lights in a row are arranged either vertically, meaning *proceed*, or in two groups, the upper ones diagonally over three others arranged vertically, indicating *approach next signal at not exceeding medium speed*, or the three upper lights horizontal over three vertical, denoting *proceed at not exceeding medium speed*. Some of these signals may be seen in figure 4.

This interlocking plant was installed under the jurisdiction of F. E. Jones, Superintendent of the Dayton Union Railway Company, and under J. D. Moffat, Chief Engineer of that Company, C. F. Stoltz, Signal Engineer of the Big Four, acting as consulting Signal Engineer. The interlocking equipment was designed, furnished and installed by the General Railway Signal Company of Rochester, whose associates are The General Railway Signal Co. Ltd, of 512, Australia House, London.

[625. 258 (.44)]

The "R apparatus" for the automatic braking of wagons in hump marshalling yards.

(*The Railway Engineer.*)

The correct retardation of wagons in gravity sorting yards is a matter of the greatest importance. On it depends the efficiency of the marshalling operations, in point of time occupied and labour required; also, in no small measure, the safety of personnel, the wear and tear on rolling-stock, and the damage to goods carried. The desideratum is to marshal the greatest possible number of wagons in a given time, with minimum damage to the vehicles and their contents, and with a minimum number of men employed in the yard. In order to achieve these results it is necessary to subject each wagon to that degree of braking which will suffice to bring it to rest at the moment when it comes into contact with wagons already standing on the track concerned. The requisite braking depends upon the initial speed of the wagon, its weight, the distance it has to run, and the conditions of weather and track. The braking of vehicles individually, by hand, is both expensive and dangerous. Systems of remote control, operated from one or more cabins at suitable points, represent an important advance, but the human element still remains the determining factor and severe requirements are imposed upon the judgement of the operator.

From a theoretical consideration of the problem it is evident that one can determine mathematically the speed at which a wagon should leave the turnout zone in order to reach, under stated conditions of running, the end wagon already standing in the siding. Given a machine capable of solving the equations involved, it can be used to apply to each wagon exactly the amount of braking necessary to ensure that it finishes its travel under the best possible conditions, that is to say by running into contact with the standing vehicles at a speed low enough to prevent any damage, either to the wagons or to the merchandise carried. Starting from these premises. Mr. Rabourdin, of the Eastern Railway of France, has invented and perfected an entirely automatic equipment, known as the « R apparatus, » which retards the shunted wagons according to their weight and speed, and the distance they have still to travel.

Component parts of equipment.

The complete « R apparatus » is electrically controlled and entirely automatic in action, but can be varied in setting to allow for atmospheric conditions. It comprises a number of braking elements placed one after the other at the entrance to each siding, and the corresponding relays and contactors in a control cabin or signal-box. The track equipment is shown diagrammatically in the illustration below. The component parts are: (1) A special type of slipper brake, designed to facilitate repair and replacement; (2) a check rail and a guide rail enabling the slipper brake to be placed on or removed from the track; (3) a motor capable of pulling the slipper brake in either direction by means

Fig. 1. — General view of approach, looking towards the hump.

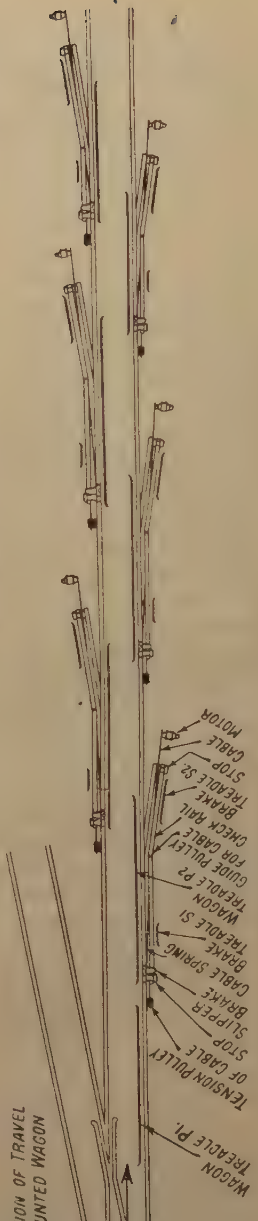


Fig. 2. — Arrangement of first six braking elements on a marshalling track.

of a cable and springs; (4) two wagon treadles, one in advance of, the other alongside, the braking track ; as the second treadle acts as advance treadle for the next braking unit, there is actually only one wagon treadle per brake; (5) a brake treadle; (6) two end stops for the slipper brake. The equipment in the control cabin includes a retarded relay enabling certain electrical contacts to be made after a predetermined time; and contactors controlling the motor supply circuit. In addition to providing the apparatus mentioned, it is necessary to divide the track into a number of sections insulated from each other and connected electrically to the time-element relays.

The number of braking units placed one behind the other, and their length, are such that it is possible to obtain : (1) With all the units, a total braking distance that makes it possible to bring

Fig. 3. — Wagon running on to slipper brake.

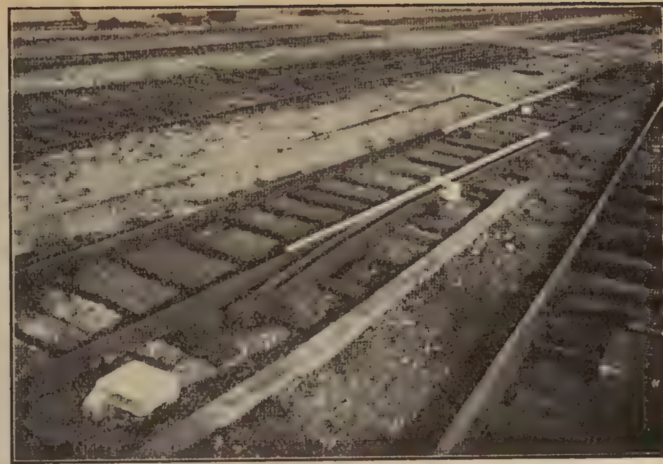


Fig. 4. — View of braking unit—right-hand side.

Fig. 5. — Switch of the brake treadle operated by slipper brake—cover removed.

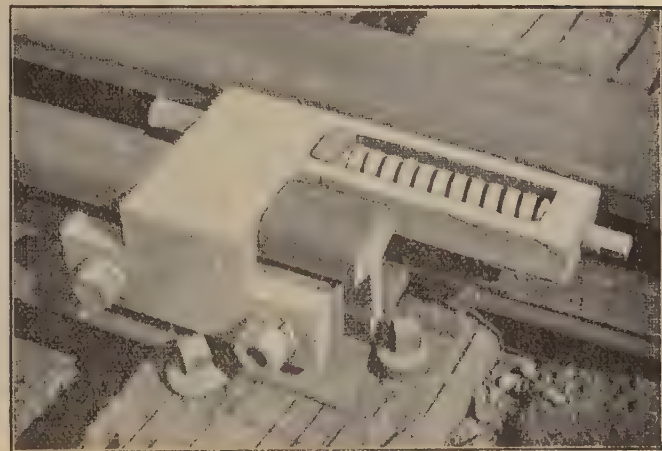


Fig. 6. — Brake stop at upper end of unit.

to zero the speed of any group of wagons (1) travelling at the maximum speed with which it can enter the siding; this speed being at least that required to send the wagons to the end of the empty track. (2) With some only of the units (1, 2, 3 . . . . n-1), a range of braking distances enabling the speed of any group of wagons to be reduced, with sufficient accuracy, to the value needed to bring them into contact with vehicles already standing on the track, but without undue shock.

Method of operation.

In the normal ready position, the slipper brake of each unit is at the upper end of the apparatus, nearest the gravity hump. When a group of wagons actuates the advance treadle of the first braking unit, the corresponding time-element relay is started and, after a certain interval, T seconds, it starts the motor in the direction corresponding to haulage of the slipper brake towards the turnout. If the group of wagons takes less than T seconds to traverse the advance treadle, the first vehicle is braked for the whole length of the unit; but if the time occupied in passing the advance treadle exceeds T seconds, the motor is started by the time-element relay, the slipper brake starts towards its turnout before the first wagon touches it, and the latter is not braked. In other words, only those groups of wagons are retarded which traverse the advance treadle at higher than a pre-

Fig. 7. — Slipper brake and springs.

determined speed. The electrical arrangements are such that the determination of the speed of the vehicles is effected solely by the first axle of the group, and is therefore independent of the number of axles and the wheelbase of the wagons.

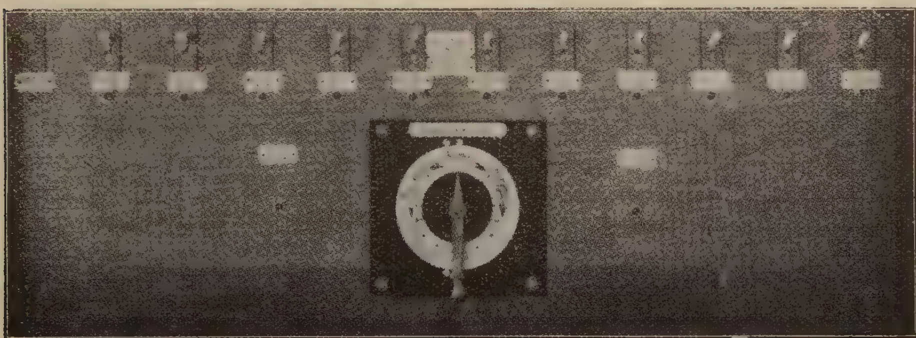
As soon as the group of wagons has cleared the first braking unit, *i.e.*, directly the treadle P_2 (see figure 2) is released, the motor starts automatically, and returns the slipper brake to its original position at the upper end of the unit, regardless of whether it was taken into the turnout by the motor or whether it was engaged by the wheel of a wagon. The brake treadle S_1 serves to interrupt the supply to the motor and stop the slipper brake in one or other of its extreme positions.

Each braking unit operates in the manner described, but the time T, at the expiration of which the motor begins to withdraw the slipper brake, depends upon the position of the unit considered relative to the other braking units. In order that wagons entering the braking system at the maximum speed V may be brought to rest at the end of the apparatus, they must be retarded by all the units, the speed of the vehicles decreasing from V to zero by n successive stages, where n = number of braking

(1) Each group containing not more than a predetermined number of axles.

units installed. The retardation of the relay of each unit corresponds to the speed of the wagons leaving the preceding unit, hence the relay settings increase progressively, the shortest time-setting being that for the braking unit nearest to the hump. It follows from this that the units at the upper end retard only those wagons which arrive at a speed approaching to the maximum value V ; wagons arriving at a lower speed are retarded only by the later braking units, the speed of all wagons in both groups being reduced to zero at the end of the apparatus, in the case considered.

Actually, the speed of vehicles at the end of the apparatus should not be zero unless the siding is already occupied up to this point. Otherwise, the wagons should leave the braking zone with sufficient velocity to carry them to the vehicles already standing in the siding. The velocity required for this purpose is higher, the greater the distance to be covered, and it is necessary to substitue a different range of relay time-settings T, according to the speed with which



Control board, showing controller for regulating degree of braking according to atmospheric conditions.

the wagons are to leave the braking apparatus. The greater this speed, the shorter the timing of the retarded relays. In the « R apparatus » the necessary readjustement of the relay timing is effected automatically directly a fresh section of the sidings is occupied by standing wagons. The time intervals in the new scale of relay settings increase as the occupied section approaches the braking zone. Further from the passage of wagons successively over the various sections of track, the apparatus permits the determination of the section on which the vehicles will come to rest and, if necessary, a scale of relay settings corresponding to the occupation of that section is substituted automatically for the settings corresponding to the occupation of the track by wagons already stopped. The adjustments resulting from the passage of a group of wagons over the successive sections of tracks are modified automatically during the travel of the vehicles if their running is for any reason irregular. In any case, the settings finally reached are those corresponding to the occupation of the track up to the section on which the wagons come to rest.

Finally, allowance must be made for the fact that wagons leaving the apparatus at a given speed run for a greater or less distance before coming to rest, according to the atmospheric conditions (wind, rain, frost, etc.). In order to

make the adjustments necessary on this account, a controller is provided to vary within predetermined limits the relation between the occupation of the track sections and the scale of relay settings. Thus, according to the atmospheric conditions prevailing, it is possible to leave the wagons, at the end of the braking zone, with different speeds for the same track occupation, *i.e.*, the same distance to run. The controller used for this purpose is the only part of the equipment requiring to be operated by hand; its manipulation can be effected very rapidly and is necessary only when the atmospheric conditions change.

Savings effected.

An experimental installation of the « R apparatus » has been in service in the Blainville marshalling yard of the Chemins de fer de l'Est for over three years, with entirely satisfactory results. No brakesmen are employed, either to retard wagons entering the siding concerned or to stop them at the bottom; and the loss by damage on this track is one-quarter of what it was before the automatic apparatus was installed. In view of these results, the Compagnie des Chemins de fer de l'Est decided to extend the use of the apparatus and to install it first in the new marshalling yard at Vaires, and later in a number of other yards.

The estimated cost of installing this type of automatic braking equipment, in a yard with thirty marshalling tracks, dealing with 2 500 wagons per diem, is approximately 6 000 000 francs (£72 300 at about 83). The annual cost of operation would be 375 000 francs (£4 500). The apparatus is marketed by the Société d'Equipement des Voies Ferrées et des Grands Réseaux électriques, 18, Rue de Tilsitt, Paris, who are also concessionnaires for Great Britain, and is, presumably, protected by patents.

It may be mentioned that the marshalling yard at Blainville is one of the largest on the Est system, and is situated on the main Paris-Strasbourg line, about 15 miles beyond Nancy where the line to Epinal and central and southern France diverges. The yard covers an area rather over two miles long, and about half a mile wide for the greater part of its length. Its capacity is about 6 000 wagons a day. The construction of the yard was begun in 1913 but — because of the war — is was not completed till 1920. The Descubes system of electric point control is used.

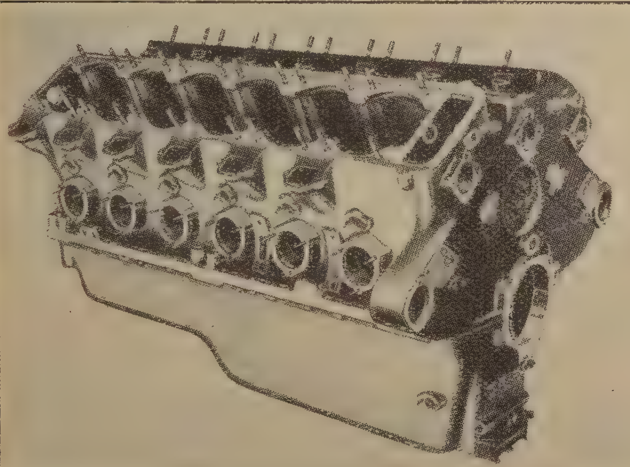
[621 .43 (.43)]

New 410-H. P. lightweight Diesel engine,

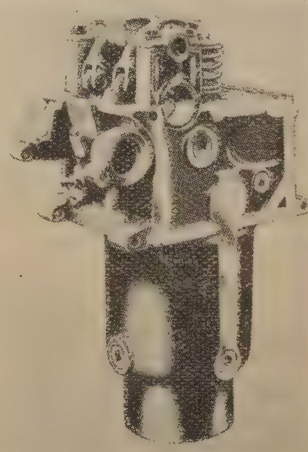
by Edwin B. A. HEINZE.

(*The Railway Gazette*)

The German State Railway Company has recently introduced several new Diesel railcars of various types equipped with a new 12-cylinder lightweight Diesel engine, supplied by the Maybach Company, having two banks of six cylinders inclined at an angle of 60°. This engine is the largest the Maybach Company has yet constructed, and develops 410 B. H. P. at 1 350 r. p. m. It differs from previous Maybach engines in having direct airless injection of the fuel charge, whereas hitherto high-speed engines of this make have used air injection.



Silumin crankcase and sump of the 12-cylinder Maybach C. I. engine.



One of the cylinder units.

Fig. 1.

The cylinders of the new engine have a bore of 150 mm. (5.9 inches) and a stroke of 200 mm. (7.87 inch); the total piston displacement thus amounts to 42 410 c. c. The compression ratio is 13 to 1. The one-piece crankshaft runs in seven roller bearings of the same built-up type as is used in the earlier Maybach Diesel engine and the airship petrol engines of the same make. The flywheel end of the crankshaft, where the timing gears are arranged, is provided with an additional radial-type ball bearing, while at the forward end, inside the crankcase, the crankshaft carries a frictional-type vibration damper. As will be seen from the sectional elevation drawing, a master connecting rod is used for one cylinder, the rod for the other cylinder of each pair being divided and

driving a pin attached to the eye of the main connecting rod in the manner shown. The big-ends are of the roller type, as are the main bearings, which have double rollers. The cylinder block is built up of individual interchangeable cylinder units, such as is shown in one of the illustrations, these being cast complete in one piece with their heads and water jackets, the separate units being bolted together to form a complete engine unit. The non-detachable cylinder heads carry the rocker supports and overhead camshaft bearings. The rockers are crescent-shaped and actuate the vertically arranged valves (one inlet and one exhaust for each cylinder) in the manner shown in the drawing. The crankcase sides of the single-piece silumin crankcase are carried high up, the cylinder units being let down into these to the level of the heads, giving a very

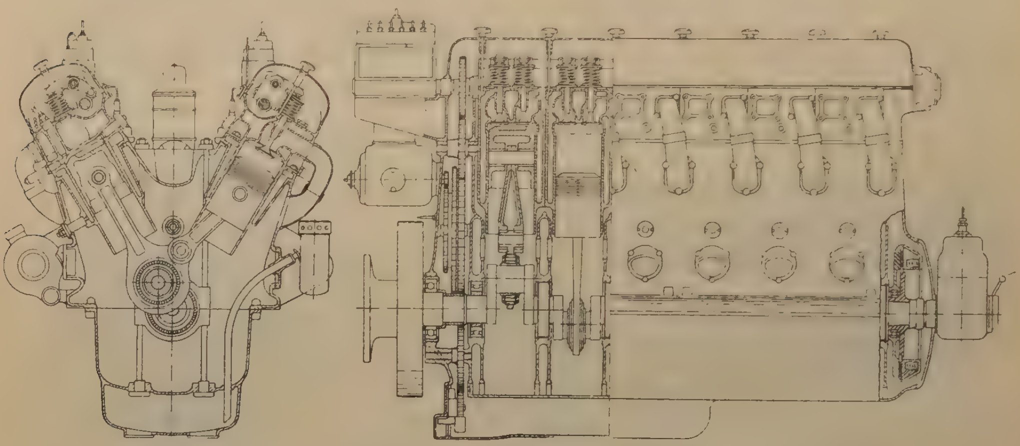


Fig. 2. — Sectional elevation of the new Maybach Diesel engine.

rigid construction. The sump is attached to the upper crankcase half by means of long bolts passing through the bearing caps to the top of the crankcase between the banks of cylinders, as shown. The two camshafts are driven by trains of gears from the flywheel end of the crankshaft. The rear ends of the camshafts are coupled directly to Deckel Compur-type fuel injection pumps, the pumps being of monobloc construction with a separate plunger for each cylinder. The timing gears also drive, on the left side of the engine (seen from the flywheel end), the governor, and on the right side a centrifugal-type cooling water pump, while the dual gear type forced-lubrication pump in the sump is driven through an intermediate gear of the crankshaft.

The aluminium pistons are provided with what may be termed tongue-shaped cavities in their crowns opening towards the injection nozzles, which are of the needle-valve type. The injection nozzles (one per cylinder) are arranged along the inside of the cylinder banks, as shown in the drawing, with the fuel jets directed slightly downwards towards the piston tops. Each inlet valve port communicates by means of the external pipe seen to the outside of the right-hand cylinder in the end section, with the outer crankcase wall, so that air is drawn in through the crankcase, which is provided on both sides with louvres

to admit air. By this arrangement excellent crankcase ventilation is obtained, and as a slight negative pressure is created inside the crankcase the emission of fumes into the engine room is effectually prevented. To prevent lubrication oil being drawn into the inlet port, the top of the sump is covered by a perforated aluminium plate.

The forced lubrication pump delivers oil through an oil cleaner carried on the outside of the crankcase, and from here one line conducts lubricant to six jets for

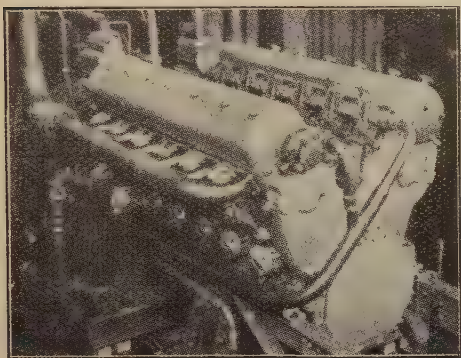


Fig. 3.— Maybach 12-cylinder 410 H.P. Diesel engine.

the lubrication of the main and big-end bearings. Another line leads oil to the timing gears, camshafts and rockers, while a third feeds a small pressure storage tank, which serves to operate the servo mechanism of the governor, controlling engine speed.

The governor is provided with a cylinder and spring-loaded piston, which latter is connected directly with the fuel-control lever of the injection pump. The centrifugal governor is controlled by a spring, the tension of which is set by a lever operated by the driver, who is thus able to choose any desired engine speed, which the governor will then automatically maintain. The latter operates a slide valve controlling the supply of pressure oil from the small storage tank mentioned above to the servomotor cylinder, where the oil presses back the piston against the spring pressure, causing the fuel charge to be increased. As soon as the engine tends to overrun the set speed, the centrifugal governor draws back the slide valve, cutting off the oil supply to the servo cylinder and, if necessary, opening a by-pass, allowing some of the oil in the cylinder to escape back into the sump.

The engine can be started by com-compressed air, but in the majority of cases it will be started by the dynamo it drives in the usual way — the engine is primarily intended for Diesel-electric traction work.

Ther performance of this Maybach engine is very satisfactory. The power curve rises in almost a straight line from 122 B. H. P. at 360 r. p. m. to 410 B. H. P. at 1 350 r. p. m., while the torque drops gradually from 1 720 ft./lb. at 400 r. p. m. to 1 520 ft./lb. at 1 400 r. p. m. The fuel consumption at full load amounts to 0.44 lb. par B. H. P. per hour and decreases to 0.39 lb. between 210 and 300 B. H. P. at 1 400 r. p. m. The complete engine weighs only 3 740 lb. so that the weight per H. P. (maximum output) is 9.13 lb. The overall length of the engine is 73.4 inches, its height 53 inches and its breadth 41.8 inches.

It is evident, from the foregoing description, that this engine cannot be cheap to produce, but, apart from its small size and low weight, it is claimed to offer the advantage of low maintenance costs because of the use of roller bearings. A similar engine, with plain bearings, working at the same speed and having the same output, would probably require a general overhaul after every 300 working hours. The Maybach company claim that such an overhaul is not required in the case of their new engine before 3 000 to 4 000 hours of operation if, during this period, two quick overhauls are carried through.

MISCELLANEOUS INFORMATION.

[656. 257]

1. — Safety device for electrically operated points,

by C. CHOUQUET, Engineer.

The arrangement described below, manufactured by the « Compagnie Générale de Signalisation », is already in use on the French State Railways. It is intended to make certain that points worked by 110-volt continuous current motors have operated properly.

Point operation. — The operating motor M is of the series type with two inductor coils, one left, and the other right; it is distant operated by a lever fitted with contacts by which the current corresponding to the direction of rotation of the moter required to operate the point can be sent through the windings of the corresponding inductor coil.

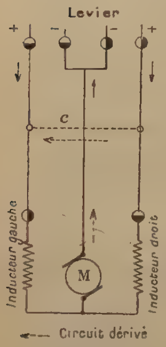


Fig. 1.
Three-wire control.

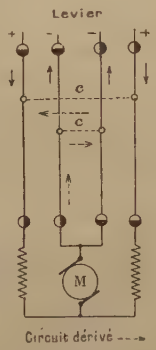


Fig. 2.
Four-wire control.

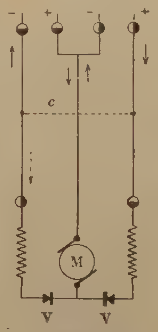


Fig. 3.
Control with safety device.

Note : Levier = Lever. — Inducteur gauche = Left and inductor coil. — Inducteur droite = Right hand inductor coil. — Circuit dérivé = Shunt circuit.

As shwon by figures 1 and 2, the control wires can be either three in number (one wire corresponding to each direction of rotation of the motor, with in addition a common return wire) or four (two wires corresponding to each direction of rotation of the motor).

These wires are made up into an indiarubber insulated armoured cable lead covered and either sunk in the ground or laid in trunking.

Point « chattering ». — If any insulation defect occurs at any point in the cable between the wires, contacts *c* may be made between them and give rise to shunt circuits setting up current conditions likely to cause the untimely operation of the motor in either direction alternately, which may result in what is called « chattering » of the points. If the point is taken in the facing direction at this moment, a derailment may occur.

It should be noted that the four-wire control is used to avoid the common return of the three-wire system; it reduces the chance of failure without however suppressing it.

Safety device. — This consists (fig. 3) of the use of a three-wire control with the interposition between the motor winding M and each of the inductor coils of a copper-oxide rectifier valve V of the type described in detail in the *Génie Civil* of the 14 April 1928, page 364. In addition, the current for

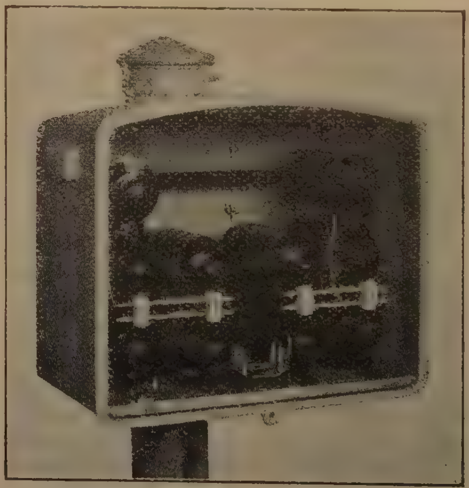


Fig. 4. — View of the safety device.

the motor must be reversed in the armature to obtain the reversal of the direction of rotation of the motor.

The two valves in question are intended to prevent the passage of any shunt currents which might cause the points to chatter; they are housed in a metal casing beside the motor. Figure 4 shows one of these fittings.

In the case of a point motor taking a maximum of 6 amperes at 110 volts, the direct resistance of the rectifier is 1 ohm, and the resistance in the reverse direction 1 200 ohms. If the motor uses a maximum of 10 amperes at 110 volts, the resistance of the rectifier is 0.06 ohm and in the reverse direction 700 ohms.

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698 (.42)

2. — New portable paint spraying plant.

(The Railway Gazette.)

A new self-contained portable two-operator paint spraying plant, of a type eminently suitable for railway work, has been introduced by B. E. N. Patents Limited, of 92, Tottenham Court Road, London, W. 1. Compactly mounted on two penumatic-tyred wire wheels, 20 inches diameter, the unit can be wheeled readily from point to point with but little effort. The drive of the compressor is through twin « V » belts, reducing vibration and wear

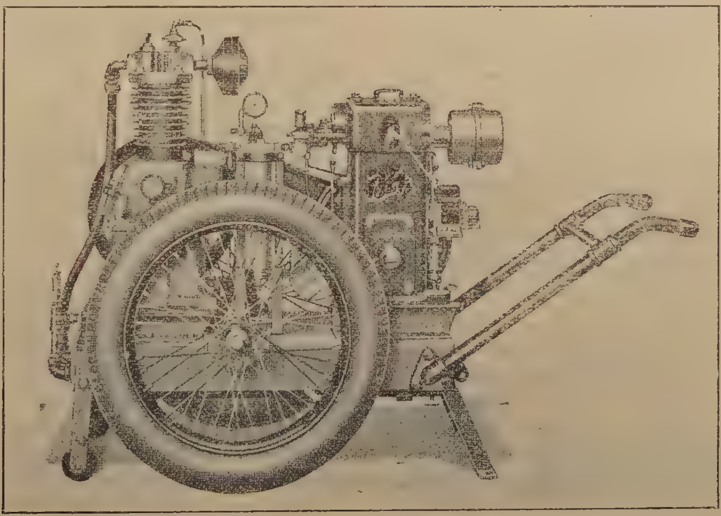


Fig. 1. — A new portable two-operator paint spraying plant.

and tear to the minimum. By reason of the exclusive design and efficient cooling of this machine, the makers guarantee the delivery of cool and therefore moisture-free air. The machine is robustly constructed to withstand heavy and continuous use.

The air compressor is a 3-inch bore by 4-inch stroke, single cylinder air-cooled unit giving a displacement of 10 cubic feet of air a minute at 615 r. p. m. Lubricating oil is forced under pressure to the crankshaft and big end bearings, and it is claimed that this system of

lubrication in conjunction with the efficient oil control piston ring effectively prevents oil being discharged with the air to the receiver. The compressor is controlled by a standard B. E. N. diaphragm head unloader which enables it to run light when the air pressure in the receiver reaches a predetermined figure as set by the unloader control. The pressure ranges from 10 to 80 lb. per sq. inch as may be required by the operator. When running unloaded, the inlet valve of the compressor is depressed, thus allowing the cool air to flush the valve gear, pistons and cylinder wall of the unit.

Two independent air outlets with cocks are provided on the moisture separator to enable two guns or two pressure paint containers to be coupled and each separately controlled. The power unit may be an air- or water-cooled petrol engine or an electric motor, to suit the customer's requirements. The electric motors are supplied complete with the necessary starters or switches, to comply with the usual electricity regulations, and all motors are continuously rated to B. E. S. A. specification.

A substantial hinged roller sprag is mounted on the forward end of the carriage for stationary running, and this sprag, which is easily pulled into position, takes the weight from the large pneumatic tyred wheels and gives a completely rigid and vibrationless unit. The complete equipment has a length of 57 inches, an overall width of 28 1/2 inches, a height of 36 inches, and a net weight of 5 cwt. 1 qr. approximately. The whole design has been most carefully worked out in the light of experience gained from the supply of similar sets to numerous users both at home and abroad.

[**625. 142.3 (.42)**]

3. — A new steel sleeper.

(The Railway Gazette.)

A new and interesting type of patented steel sleeper, designated the C. M. V., has just been put on the market by R. A. Skelton & Co., Steel & Engineering Limited. As will be seen from the illustrations, the design, though novel, is simple, and consists, in effect, merely

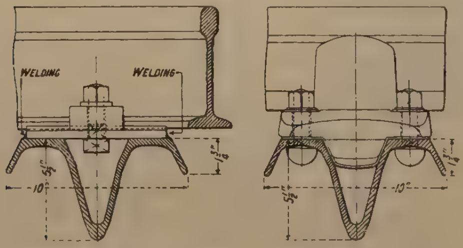


Fig. 1.

of the provision of a deep « V » in the centre of the ordinary flanged steel sleeper. This simple device has, however, two definite advantages. In the first place, it adds greatly to the rigidity of the sleeper, which is an important consideration in these days of higher axle loads and speeds. A second important consideration is the facility with which fastenings can be replaced, when required, without seriously disturbing the track, whereas with many types of sleepers bolts cannot be removed without clearing away the ballast from underneath the sleeper. Thus the C. M. V. sleeper not only effects a considerable saving of labour in such cases, but overcomes the difficulty of ensuring that the ballast beneath the sleeper is firmly and uniformly packed. This proper tamping of the ballast is further facilitated by the fact that the outer flanges can be made much shallower than those of the ordinary steel sleeper, since the centre « V » provides all the requisite rigidity. As may be seen from the illustrations, the system is equally applicable to bull-head and flat-bottomed rails, and various types of fastenings other than those shown can be employed with these sleepers.

Fig. 2.

With this type of sleeper it is claimed to be unnecessary to turn down the ends, as is commonly done with the ordinary pea-pod sleeper, owing to the increased resistance of lateral movement caused by the wedging action of the « V » on the adjoining ballast. The ends can nevertheless be turned down, if required, by cutting away a portion of the « V » and bending over the side wings. The rails can be canted either by using tapered sole plates or by cambering the sleeper itself.

When used on the customary scale, the most economical method of manufacture is to roll from a wide flat of appropriate section. And in this way the metal can be thickened where it is required for strength, namely, at the apex of the « V » and in the horizontal flanges. The section can, of course, equally well be pressed from a flat plate, in which case, however, the thickness of the metal must necessarily be uniform, thus increasing the weight and cost.

In a booklet issued by them, R. A. Skelton & Co. explain that any steel manufacturer is at liberty to produce these sleepers under licence to be obtained from them. In other words, they do not propose to manufacture the sleeper themselves, but merely to claim a royalty for the use of the invention. This is a decided advantage from the user's point of view, since it enables competitive tenders to be obtained and orders to be placed with steelworks best placed to supply economically.

This sleeper is the invention of a British railway engineer, and is patented not only in Great Britain but in all the principal steel-manufacturing countries.

[**625. 162** (.82) & **656. 254** (.82)]

4. — Level crossing protection in Argentina.

(The Railway Gazette.)

The protection of highway crossings in Argentina is a problem which has come very much to the forefront in recent years due largely, as in other countries, to the tremendous increase in road traffic. Until comparatively recently such protection was mainly confined to the use of fixed warning signs or manually operated barriers, which there, as elsewhere, have been found undesirable on the grounds of cost of operation and dependence upon the human element, a point to be taken seriously into account in view of the fact that the necessity to limit expenditure precludes the payment of wages sufficiently high to attract a good class of staff.

The growing popularity of automatic flasher light signals led to their trial on these lines as a substitute for barriers, but here difficulties of an order in no way due to inherent defects in the apparatus and material available were immediately encountered. The main of these was wilful and malicious interference on the part of the very people for whose protection the apparatus had been installed, and it was found necessary to limit as far as possible, or render less visible, anything which was at all subject to such interference. Secondly, in most cases the light traffic does not warrant the expenditure in upkeep of ballast necessary to give insulation suitable for regu-

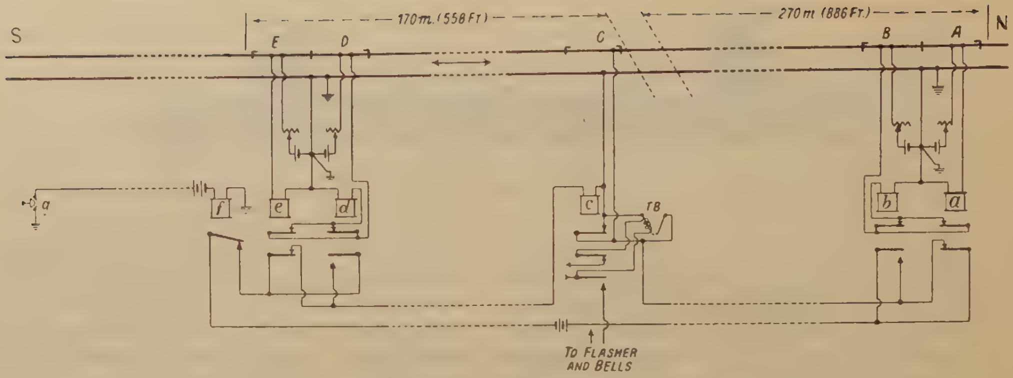


Fig. 1. — Diagram of the new installation now in operation.

lation track circuits, or the stability required to enable any rail contactor depending upon rail flexure for its operation to be kept in adjustment.

Experiments were therefore made to determine whether satisfactory operation, especially good shunts, could be obtained by the use of short track circuits, each consisting of single rail lengths of insulated track in substitution of contactors, the installation being similar in other respects to a contactor operated scheme. It was considered that the extremely short length of the track circuits, and consequent smaller ballast leakage, would render their use feasible where track conditions were poor. This expectation was fully realised, and an installation made on these lines was found to work very satisfactorily in so far as technical difficulties were concerned. There still was, however, frequent interruption due to wilful interference, mainly the breakage of the exposed ends of the connections where made to the webs of the rails. This difficulty was largely overcome by making the connections in the under sides of the flanges of the rails where they are practically invisible, while the co-operation of the local authorities has doubtless had some effect, with the result that such interruptions have been almost or entirely eliminated. Trouble was also experienced by malicious short-circuiting of the outer track circuits, which caused the signals to operate continuously until either the batteries were exhausted or the circuit was normalised by the passage of a convoy over the stop track circuit at the level crossing or by the linesman.

A further installation was under consideration regarding which our previous experience suggested the following improvements :

a) That only one rail, *i. e.*, the positive, need be insulated, the other rail being efficiently earthed and acting as a common return, thereby further reducing the effect of ballast leakage and, more important, also reducing the number of connections to the track and consequent liability to wilful interference.

b) That, in order to limit false ringing as far as possible, a time element relay should be employed to cause the signals automatically to cease to operate, and normalise the circuit at the end of a period of fifty seconds, this time being decided upon in order to avoid the flasher ceasing to operate before a slow moving train could reach the crossing, as the time element relay necessarily operates for every move, whether through or shunting.

c) In this case the proximity of the crossing to the station rendered it necessary to limit the distance between the outer start and the stop track circuits to 170 m. (660 feet) to avoid false ringing due to fouling during shunting operations. This distance, it was considered, would provide a sufficiently long period of alarm for slow moving trains, but not so for through fast trains; therefore it was decided to prolong the control circuit to the station and provide means whereby the

stationmaster could cause the signals to operate on the passage of fast trains through the station. In case of his omitting to do this the alarm would, of course, begin to function when the train fouled the track circuit, although, as mentioned above, the period would be short.

The operation of the installation embodying these modifications has now been working for some time, with extremely satisfactory results. The accompanying diagram may therefore be of interest to others faced with similar difficulties.

Operating current is obtained from three Exide 80-ampere-hour accumulators, which are charged from the town supply through a 220-volt, 75-watt lamp, the charge being about 0.25 ampere for 8 hours, the supply being available only by night. The intermittent load is about 8 amperes and the number of train moves some 14 a day. A further 75-watt lamp is cut in occasionally in parallel to give a boosting charge when the linesman is revising the signals.

As the neutral of the 440-volt D. C. town supply is earthed, and as the negative rail of all the track circuits is also earthed, it was found expedient to provide a separate battery for energising the control circuit. This battery, together with the track circuit batteries, is composed of Waterbury 500 ampere-hour cells.

The installation was placed in service after a period of heavy rain, but its operation was perfectly satisfactory.

NEW BOOKS AND PUBLICATIONS.

[656. 25 (0 (.73), 656. 256.2 (.73) & 656. 257 (.73)]

AMERICAN RAILWAY ASSOCIATION, SIGNAL SECTION. — **American Railway Signaling Principles and Practices.** — Published by Signal Section, A. R. A., 30, Vesey Street, New York, N. Y. — 3 pamphlets (8 × 6 inches) : Chapter XIV, **Definitions** (82 pages). Chapter XVII, **Mechanical and Electro-Mechanical Interlocking** (70 + 16 pages, illustrated). Chapter XX, **Interlocking Circuits** (150 + 20 pages, illustrated). (Price per pamphlet : Respectively 35, 35 and 45 cents, reduced to 25, 25 and 35 cents for members of the A. R. A. and railroad employees. Binder for 13 Chapters : 1 dollar.)

We have previously called our readers' attention to this interesting series of technical papers published by the American Railway Association, a brief analysis of some of the sections having been given in the November 1927 and March and December 1931 issues of this *Bulletin*.

Chapter No. XIV gives, in alphabetical order, the definition of a large number of expressions used in signalling, the definition frequently being completed by indicating the most usual application of the apparatus or detail. The great variety of signalling installations justifies this section to which reference can be made usefully to avoid confusion and to grasp the exact meaning of the descriptions given.

Chapter XVII describes mechanical and electro-mechanical interlocking equipment. This chapter, in the case of centralised equipment, deals with the control of the signals and points, the interlocking details themselves being described in section XVI. According to the definitions given by the Signal Section of the A. R. A., the interlocking is still included under the heading of mechanical if an electric lock, a circuit controller operated by a mechanical lever, or a completely separate circuit controller controlling the working of the apparatus linked together in the box is added. The electro-mechanical apparatus is that which includes mechanical levers and electrical levers.

Descriptions with drawings are given of the principal types of interlocking plants in use and of certain frequently used safety devices such as electric locks, circuit controllers and time release interlocking. Detailed information is given on the frames and foundations, on rodding and signal wires, on compensation and adjustment of the length of the rod and wire lines and finally on the locking of the points and the bolt lock.

The usual questionnaire and instructions on erection and repair complete the chapter.

Chapter XX describes the electric operating circuits of the apparatus in installations in which electricity is the motive power, and the interlocking and control circuits used in these installations and in the mechanical and electro-pneumatic boxes.

The wiring diagrams have been made easy to read by the very clear separation of the circuits, and by the exact position of the electrical appliances relatively to the tracks not being adhered to.

This small volume contains considerable technical information. Whilst certain appliances belong especially to American signalling practice, most of them make use of principles which can be applied generally.

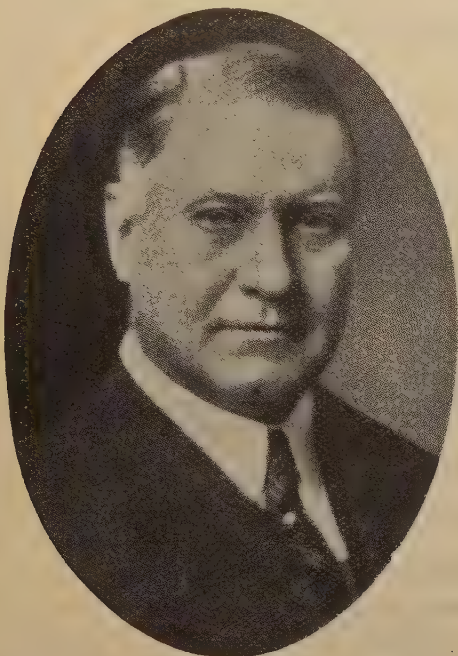
E. M.

[385. (09. 2]

OBITUARY.

Sir Henry W. THORNTON, K. B. E.,

Late Chairman and President of the Canadian National Railways,
Member of the Permanent Commission of the International Railway Congress Association.



It is with deep regret that we have heard of the death, at the age of 61, of Sir Henry Thornton, until recently President of the Canadian National Railways.

Born in Indiana (U. S. A.) in 1871, he graduated as Bachelor of Science from the University of Pennsylvania in 1894 and subsequently entered the service of the Pennsylvania Lines as a draughtsman. After gaining much engineering experience on this System, he was appointed Assistant General Superintendent of the Long Island Railroad in 1911, and General Superintendent at the end of the same year.

In 1914, he was selected as the General Manager of the Great Eastern Railway (Great Britain).

During the war, Sir Henry was a member of the Railway Executive Committee, working and controlling all British Railways.

In 1916, he was made Deputy Director of Inland Water Transport, while as from 1917 he also held the position of Engineer in Chief of the Great Eastern Railway.

He was sent to France in the same year, as Assistant Director General of Movements and Railways, being promoted ultimately to the rank of Inspector General of Transport.

Sir Henry, who had become a British subject by naturalisation, was knighted in 1919.

In 1922, he was selected as Chairman and President of the Canadian National Railways, which, thanks to his real gifts of leadership, his personal influence and skill, he succeeded in bringing to prosperity in the first years of his tenure.

In 1929, he was appointed a Director of the Royal Bank of Canada.

Sir Henry resigned from his position of Chairman and President of the Canadian National Railways in July 1932.

He was a member of the Institution of Civil Engineers, the Institute of Transport and the American Society of Mechanical Engineers.

He took a great interest in the International Railway Congress Association, and was a member of its Permanent Commission.

We offer our most sincere sympathy to his family.

The Executive Committee.

ERRATA.

Bulletin, October 1932, page $\frac{2036}{IX - 70}$

Report on question IX (Cairo Congress, 1933), by Mr. VLAIKOFF.

First column, 14th and 15th lines :

Instead of : « Tests are about to be undertaken... »

Read : « Tests have been carried for several years... »

Second column, 1st line :

Instead of : « 0.8 amperes... »

Read : « 0.080 ampere... »

Second column, 22nd and 23rd lines :

Instead of : « ... electro-pneumatically... »

Read : « mechanically or pneumatically... »

Bulletin, April 1932.

Article entiled : **Signal reform in Germany**, page 388.

The name of the Author is REULEAUX instead of RELEAUX.

Page 391, bottom line :

Instead of : « ... automatic replacer gear »,

Read : « ... independent levers. »

MONTHLY BIBLIOGRAPHY OF RAILWAYS (1).

PUBLISHED UNDER THE SUPERVISION OF

P. GHILAIN,

General Secretary of the Permanent Commission of the International Railway Congress Association.

(JANUARY 1933)

[016 .385. (02]

I. — BOOKS.

In French.

1932 385. (08 (.44)

Annuaire 1932-1933 de la Chambre Syndicale des Fabricants de matériel pour chemins de fer et tramways.

Paris (8e), Chambre syndicale, 7, rue de Madrid. Un volume, 550 pages. (Prix : 40 francs français.)

1932 62. (02

Agenda Béranger pour 1933.

Paris (6e), Librairie polytechnique, Ch. Béranger, 15, rue des Saints-Pères. Un volume (14 × 9 cm.), 345 pages. (Prix : 16 francs français.)

1932 621 .31

LAGRON (L.).

Les moteurs à courants alternatifs.

Paris (6e), Dunod, 92, rue Bonaparte. Un volume (12 × 19 cm.), 350 pages avec 211 figures. (Prix: 44 francs français.)

1932 313 : 625 .2 (.437)

CHEMINS DE FER DE L'ETAT TCHECOSLOVAQUE.

Statistique de transport des chemins de fer de l'Etat tchécoslovaque pour l'exercice 1931.

Praha, Nákladem Csl. státnich drah. Tiskl Jar. Strojil v Prerove. Un volume de 234 pages et tableaux. (Prix : Kc. 50.)

1932 385 .113 (.437)

CHEMINS DE FER DE L'ETAT TCHECOSLOVAQUE.

Rapport annuel de l'entreprise des chemins de fer de l'Etat tchécoslovaque pour l'exercice 1931.

Praha, Nákladem Csl. státnich drah. Tiskl Jar. Strojil v Prerove. Un volume 173 pages, avec figures, tableaux et cartes. (Prix : Kc. 50.)

1932 621 .31

MATHIEU (M.).

Transformateurs de puissance et bobines d'inductance.

Paris (6e), Dunod, 92, rue Bonaparte. Un volume (12 × 19 cm.), 305 pages, avec 84 figures et 30 photographies. (Prix : 32 francs français.)

1932 624. (06

Mémoires de l'Association Internationale des Ponts et Charpentes.

Paris (6e), Librairie polytechnique, Ch. Béranger, 15, rue des Saints-Pères. Un volume (17 × 24 cm.), 517 pages, figures et tableaux. (Prix : 200 francs français.)

1932 62. (02

NACHTERGAL (A.).

Aide-mémoire pratique de résistance des matériaux.

Paris (6e), Librairie polytechnique, Ch. Béranger, 15, rue des Saints-Pères. Un volume (16 × 25 cm.), 692 pages, avec 878 figures et 500 applications résolues. (Prix : 125 francs français.)

1932 624. (06

Publication préliminaire au premier congrès de l'Association internationale des Ponts et Charpentes.

Paris (6e), Librairie polytechnique, Ch. Béranger, 15, rue des Saints-Pères. Un volume (17 × 24 cm.), 686 pages, figures et tableaux. (Prix : 200 francs français.)

1932 347 .762

TRAVERS (M.).

Le Droit commercial international. Volume V.

Paris, Librairie du Recueil Sirey, 22, rue Soufflot, 614 pages.

In English.

1932 385

BROWN (A.).

The railway problem.

London, Simpkin Marshal Limited, Stationers' Hall Court, E. C. 4 (8 3/4 in. × 6 in. × 1 in.), 144 pages. (Price : 3 sh. 6 d.)

1932 385 (.73)

DANIELS (W. M.).

American Railroads : Four phases of their history.

London, Humphrey Milford, Oxford University Press, 120 pages. (Price : 9 sh.)

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress conjointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway Science », by L. WEISSENBRUCH, in the number for November 1897, of the *Bulletin of the International Railway Congress*, p. 1509).

1932 621 .133.1 (0 72
HIMUS (G. W.).
Fuel testing. Laboratory methods in fuel technology.
London, Leonard Hill, Ltd. (Price : 15 sh.)

1932 621 .86 & 621 .87
KOSHLIN (J. Simeon).
Modern materials handling.
New York, John Wiley and Sons, Inc. London, Chapman and Hall, Limited. 1 volume. (Price : 37 sh. 6 d.)

1932 693 & 721 .9
REYNOLDS (C. E.)
Reinforced concrete designers' handbook.
London. Published by Concrete Publications, Ltd. (7 × 10 inches), 297 pages, tables and line drawings. (Price : 15 sh.)

1932 693 & 721 .9
TURNEAURE (F. E.) and MAUER (E. R.).
Principles of reinforced concrete construction.
New York and London, John Wylie & Sons (6 × 9 inches); 461 pages, charts and line drawings. (Price : $ 4.)

1932 624 .2
URQUHART (L. C.) and O'ROURKE (C. E.).
Stresses in simple structures.
New York and London, McGraw-Hill Book Co. (6 × 9 inches), 333 pages and diagrams. (Price : $ 3.50.)

In German.

1932 624 .9
LASKUS (A.).
Hölzerne Brücken.
Berlin, Wilhelm Ernst & Sohn. 1 Band, 173 Seiten mit 311 Abbildungen. (Preis : 11.40 R.M.)

1932 621 .137.1
NORDMANN (Dr.-Ing. H.).
Die Schule des Lokomotivführers.
II. Band : **Maschine und Fahrgestell, Lokomotivbauarten, Bremsen.**
Berlin, Julius Springer. Mit 546 Seiten und 409 Abbildungen. (Preis : 24.50 R.M.)

1932 669 .1
REISER (F.).
Das Härten des Stahles.
Leipzig, Arthur Felix. 1 Band, 201 Seiten mit 98 Abbildungen. (Preis : 12 R.M.)

1932 621 .44
STEINITZ (E. W.).
Richtige Maschinenschmierung, Kraftmaschinen, Arbeitsmaschinen, Transportwesen, Kraftfahrzeuge.
Berlin, Julius Springer. 1 Band, 177 Seiten mit 4[illegible] Abbildungen. (Preis : 7.80 R.M.)

1932 669. (0[illegible]
TAMMANN (G.).
Lehrbuch der Metallkunde.
Leipzig, Leopold Voss. 1 Band, 536 Seiten mit 38[illegible] Abbildungen. (Preis : 49.50 R.M.)

1932 621 .3[illegible]
UHLIG (H.)
Erläuterungen zu den Vorschriften nebst Ausführungs-regeln für elektrische Bahnen.
Leipzig, Johann Ambrosius Barth & Brüssel, Falk Fils, rue des Paroissiens, 22. 1 Band, 128 Seiten mit Abbildungen. (Preis : 7.80 R.M.)

In Italian.

1932 669 .1[illegible]
GUZZONI (Dott. G.).
Gli acciai comuni e speciali.
Milano, U. Hoepli. Un volume 16 × 24 cm., 472 pagine con 234 fig. e 19 tavole. (Prezzo : L. 60.)

[**016** .385. (05]

II. — PERIODICALS.

In French.

Annales des ponts et chaussées. (Paris.)

1932 625 .143.5
Annales des ponts et chaussées, juillet-août, p. 21.
MARTINET (M.). — **Sur le cheminement des voies.** (4 000 mots & fig.)

Annales des travaux publics de Belgique. (Bruxelles.)

1932 624 .[illegible]
Annales des travaux publics de Belgique, octobre, p. 68[illegible]
KARPINSKI (J.). — **Nouvelles recherches sur le calcul des ponts suspendus.** (16 000 mots & fig.)

1932 721 .[illegible]
Annales des travaux publics de Belgique, octobre, p. 72[illegible]
GOOSSENS (J.). — **Contribution à l'étude des déformations des arcs à trois rotules sous charges mobiles.** (6 000 mots & tabl.)

1932 — 624 .61 (.493)
Annales des travaux publics de Belgique, octobre, p. 749.
LEKENNE (M. J.). — Le nouveau **pont** de Visé. (13 000 mots & fig.)

Arts et Métiers. (Paris.)

1932 — 531 .45
Arts et Métiers, n° 144, septembre, p. 325.
MARTIN (L.). — Le frottement des **roulements** à billes et des **coussinets** lisses. (4 000 mots & fig.)

Bulletin de la Société d'encouragement pour l'industrie nationale. (Paris.)

1932 — 621 .392
Bulletin de la Société d'encouragement pour l'industrie nationale, n^os 7, 8, 9, juillet, août, septembre, p. 483.
LANGUEPIN (J.-E.). — La **soudure électrique** par résistance. (3 000 mots & fig.)

Bulletin de l'Union internationale des chemins de fer. (Berne.)

1932 — 385 .113 (.43)
Bulletin de l'Union Internationale des chemins de fer, août-septembre, p. 239.
La compagnie des **chemins de fer allemands** pendant l'exercice 1931. (6 500 mots.)

1932 — 656 .231 (.73)
Bulletin de l'Union Internationale des chemins de fer, août-septembre, p. 268.
La décision de l'Interstate Commerce Commission sur la demande d'augmentation de leurs **tarifs** déposée par les chemins de fer américains. (8 000 mots.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1932 — 313 .385 (.494)
Bulletin des transports internationaux par chemins de fer, septembre, p. 488.
Statistique des chemins de fer suisses pour l'exercice 1930. (3 000 mots.)

1932 — 313 .385 (.439)
Bulletin des transports internationaux par chemins de fer, octobre, p. 532.
Statistique des chemins de fer royaux de l'Etat hongrois pour l'exercice 1930-31. (1 000 mots.)

Génie civil. (Paris.)

1932 — 621 .89
Génie civil, n° 2615, 24 septembre, p. 299.
GANE (E.). — **Les roulements sur films d'huile.** Recherches expérimentales faites au Laboratoire de technologie de Manchester, par R. O. Boswall. (2 200 mots, 2 tableaux & fig.)

1932 — 669 .1
Génie civil, n° 2615, 24 septembre, p. 304.
GANE (E.). — Installation de **traitement thermique** avec chauffage électrique pour pièces de grandes dimensions, aux Anciens Etablissements Cail. (1 600 mots & fig.)

1932 — 62. (01
Génie civil, n° 2615, 24 septembre, p. 306.
La mesure des **fortes pressions** à variations rapides (2 500 mots & fig.)

1932 — 624 .32 (.44)
Génie civil, n° 2615, 24 septembre, p. 309.
La mise en place du nouveau **pont-rails** sur l'Oise, à Pontoise. (500 mots & fig.)

1932 — 62. (01 & 721 .9
Génie civil, n° 2616, 1^er octobre, p. 332.
LOSSIER (H.). — Etude expérimentale d'une **construction en béton armé** soumise à des charges répétées pendant plusieurs années. (1 200 mots & fig.)

1932 — 62. (01
Génie civil, n° 2617, 8 octobre, p. 353.
MONTEUX (E.). — L'épaisseur des **conduites forcées à hautes pressions.** Leur renforcement par anneaux ou leur frettage en fils d'acier. (3 300 mots & 1 fig.)

1932 — 656 .1 (.44)
Génie civil, n° 2618, 15 octobre, p. 386.
La **concurrence du rail et de la route.** Projet d'exploitation par des services routiers dans la région de Guise. (1 500 mots.)

Les Chemins de fer et les Tramways. (Paris.)

1932 — 621 .132.8 (.61)
Les chemins de fer et les tramways, octobre, p. 161.
SPIESS (E.). — **Locomotive, type Beyer-Garratt,** pour trains express du P.-L.-M. algérien. (2 700 mots & fig.)

1932 — 621 .335 (.44)
Les chemins de fer et les tramways, octobre, p. 165.
Automotrices 1 500 volts du réseau du Tarn et de la Haute-Garonne. (2 700 mots & fig.)

1932 — 621 .133.7
Les chemins de fer et les tramways, octobre, p. 169.
DUCHESNOY. — **Alimentation en eau des trains en marche.** (1 100 mots & fig.)

1932 — 621 .137.1
Les chemins de fer et les tramways, octobre, p. 179.
Chargeur mécanique pour locomotive. (600 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1932 — 625 .2
L'Industrie des voies ferrées et des transports automobiles, septembre, p. 263.
BOURBEAU (M.). — La **construction métallique** appliquée aux voitures de tramways. (4 000 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1932 **621 .132.8 (.61)**
Revue générale des chemins de fer, octobre, p. 303.
DUCLUZEAU (M.). — **Locomotive articulée Garratt** double Mountain 241 + 142 pour voie métrique de Blida-Djelfa. (4 000 mots & fig.)

1932 **621 .133.1 (.44)**
Revue générale des chemins de fer, octobre, p. 314.
GODFERNAUX (R.). — Le **charbon** et les chemins de fer français. (12 000 mots.)

1932 **313 : 385 (.44)**
Revue générale des chemins de fer, octobre, p. 334.
Résultats obtenus en 1931 sur les réseaux des cinq compagnies principales des chemins de fer français. (Tableaux.)

Revue universelle des transports et des communications. (Paris.)

1932 **625 .215**
Revue universelle des transports et des communications, juillet, p. 21.
FORTICHIARI (Dr. C.). — Essai d'application de **bogies** système Liechty sur des voitures à deux essieux. (800 mots & fig.)

In English.

Bulletin, American Railway Engineering Association. (Chicago.)

1932 **385 .1 (.73)**
Bul. Amer. Ry. Eng. Ass^{on}, June, p. 1.
Equality of opportunity. — Statement Addressed to the American Public by the Association of Railway Executives. (1 200 words.)

1932 **625 .1 (06 (.73)**
Bul. Amer. Ry. Eng. Ass^{on}, June, p. 5.
The thirty-third **annual convention of the A. R. E. A.** — Address of President L. W. Baldwin. Address by Hon. Claude R. Porter, chairman, Interstate Commerce Commission. (8 500 words.)

1932 **625 .143.4 (.73)**
Bul. Amer. Ry. Eng. Ass^{on}, June, p. 19.
TALBOT (Dr. A. N.). — Some features of **rail-joints.** (2 100 words & fig.)

1932 **625 .143. (0**
Bul. Amer. Ry. Eng. Ass^{on}, June, p. 23.
TALBOT (Dr. A. N.). — The desirability of **reducing to a minimum the present variability factors in track.** (3 500 words & fig.)

1932 **625 .143.3 (.73)**
Bul. Amer. Ry. Eng. Ass^{on}, June, p. 31.
MOORE (Prof. H. F.). — Joint investigation of **fissures in rails.** (2 000 words & fig.)

1932 **656 .254 (.73)**
Bul. Amer. Ry. Eng. Ass^{on}, June, p. 39.
RUDD (A. H.). — **Centralized traffic control.** (1 400 words & fig.)

1932 **385 .1**
Bul. Amer. Ry. Eng. Ass^{on}, June, p. 48.
FRITCH (L. C.). — **The railroads, in retrospect, in prospect.** (6 500 words.)

1932 **385. (061.4 & 625 .1 (02 (.73)**
Bul. Amer. Ry. Eng. Ass^{on}, July, p. 1.
Revisions and additions to the **Manual, A. R. E. A.** (34 000 words & fig.)

Engineer. (London.)

1932 **624 .8 (.593)**
Engineer, n° 4001, September 16, p. 273.
Concrete work of the Bangkok bridge. (1 800 words & fig.)

1932 **621 .13, 621 .335 & 621 .43**
Engineer, n° 4001, September 16, p. 274.
Abstracts of **papers presented to section G of the British Association** for the Advancement of science at the meeting held at York, on the 5th September 1932. Short account of the discussion. (7 900 words.)

1932 **621 .33 (.42)**
Engineer, n° 4001, September 16, p. 276.
Barking-Upminster **electrification.** (1 800 words & fig.)

1932 **621 .33 (.489)**
Engineer, n° 4001, September 16, p. 278.
Railway **electrification** in Denmark. (300 words.)

1932 **62. (01 & 669**
Engineer, n° 4001, September 16, p. 284.
GOUGH (H. J.). — **Corrosion-fatigue of metals.** (5 500 & fig.)

1932 **621 .31 (.71)**
Engineer, n° 4002, September 23, p. 301.
The Chats Falls **hydro-electric power development.** (2 500 words & fig.)

1932 **621 .92**
Engineer, n° 4002, September 23, p. 301; n° 4003, September 30, p. 326; n° 4004, October 7, p. 348; n° 4005, October 14, p. 370.
Precision grinding machines. (13 000 words & fig.)

1932 **669 (06 (.42)**
Engineer, n° 4002, September 23, p. 308; n° 4003, September 30, p. 325; n° 4004, October 7, p. 350.
Iron and Steel Institute and Institute of Metals. (Joint Autumn 1932 meeting.) (8 000 words.)

1932 **621 .33 (.42)**
Engineer, n° 4002, September 23, p. 310.
Barking-Upminster **electrification. Mercury arc rectifiers.** (Conclusion.) (3 600 words & fig.)

1932 **669**
Engineer, n° 4002, September 23, p. 314.
Corrosion of non-ferrous metals and alloys. (1 300 words.)

1932 **385. (.71)**
Engineer, n° 4003, September 30, p. 333.
The **Canadian Railways.** (2 400 words.)

1932 **621 .31**
Engineer, n° 4003, September 30, p. 336.
Oil pressure circuit-breakers. (1 600 words & fig.)

1932 **621 .392**
Engineer, n° 4003, September 30, p. 337.
Automatic carbon arc welding. (600 words & fig.)

1932 **656 .1 & 656 .2**
Engineer, n° 4005, October 14, p. 383.
Road and Rail. (1 400 words.)

Engineering. (London.)

1932 **621 .13, 621 .333 & 621 .43**
Engineering, No. 3479, September 16, p. 318.
The British Association Meeting at York. Section G. — Engineering. (4 700 words & fig.) (To be continued.)

1932 **62. (01 & 669**
Engineering, No. 3479, September 16, p. 323.
Corrosion-fatigue of metals. (3 900 words.)

1932 **621. 33**
Engineering, No. 3479, September 16, p. 325.
LYDALL (F.). — **Railway traction** by electric power. (4 400 words & fig.)

1932 **621 .43**
Engineering, No. 3479, September 16, p. 333.
DAVIES (S. J.). — The Michel **high-speed oil engine** and its performance. (4 300 words, tables & fig.) (To be continued.)

1932 **621 .13**
Engineering, No. 3479, September 16, p. 341.
TRITTON (Sir Seymour B.). — **Railway traction** by steam power. (3 100 words.)

1932 **669 .1**
Engineering, No. 3479, September 16, p. 345.
Nickel-chromium- silicon cast irons. (2 500 words.)

1932 **669. (06 (.42)**
Engineering, No. 3480, September 23, p. 349; No. 3481, September 30, p. 393; No. 3482, October 7, p. 409.
Iron and Steel Institute and Institute of Metals joint Autumn Meeting. Joint meeting September 15. (21 000 words.)

1932 **621 .43**
Engineering, No. 3480, September 23, p. 353.
DAVIES (S. J.). — The Michel **high-speed oil engine** and its performance. (2 500 words, tables & fig.) (Concluded.)

1932 **625 .4 (.42)**
Engineering, No. 3480, September 23, p. 368.
The Arnos Grove **extension of the Piccadilly Railway.** (2 500 words & fig.)

1932 **62. (01 & 669**
Engineering, No. 3480, September 23, p. 372.
BACON (Prof. F.). — **Cracking and fracture in rotary bending tests.** (9 000 words & fig.)

1932 **62. (01 & 669 .1**
Engineering, No. 3481, September 30, p. 402.
HANKINS (G. A.). and BECKER (M. L.). — The **fatigue resistance of unmachined forged steels.** (2 500 words & fig.)

1932 **656 .213**
Engineering, No. 3482, October 7, p. 405.
CUNNINGHAM (B.). — **Transatlantic passenger jetty** at the port of Bordeaux. (4 800 words & fig.)

1932 **621 .31 (.42)**
Engineering, No. 3482, October 7, p. 429.
The Iron bridge **generating station** of the West Midlands Joint Electricity Authority. (4 900 words & fig.)

1932 **621 .31**
Engineering, No. 3483, October 14, p. 456.
Extra-high tension circuit-breaker with oil pressure rupture. (2 200 words & fig.)

Engineering News-Record. (New York.)

1932 **625 .13 (.73)**
Engineering News-Record, No. 8, August 25, p. 227.
Rock Island **Lift Bridge erected on old fixed spans.** (3 500 words & fig.)

1932 **625. 4 (.73)**
Engineering News-Record, No. 9, September 1, p. 243.
HAUER (D. J.). — Newark solves **complex transit problem.** (2 500 words & fig.)

1932 **721 .3 (.73)**
Engineering News-Record, No. 10, September 8, p. 277.
GERMUNDSSON (T.). — **Concrete columns with large bars** offer advantages. (1 700 words & fig.)

1932 **625 .4 (.73) & 721 .3 (.73)**
Engineering News-Record, No. 10, September 8, p. 280.
WASHBOURNE (J. L.). — **Jack-frame underpinning** offers advantages. (1 500 words & fig.)

1932 **62. (01 (.73)**
Engineering News-Record, No. 10, September 8, p. 284.
New **materials laboratory** at Berkeley. (2 500 words & fig.)

1932 **656 .258 (.73)**
Engineering News-Record, No. 10, September 8, p. 294.
SMITH (S. M.). — **One-piece rail lock for bascule bridge,** Wabash Railway. (500 words & fig.)

1932 **621 .392 & 721 .9**
Engineering News-Record, No. 11, September 15, p. 312.
TRACY (H. H.). — **Welded joints for seismic stress** in a tall building. (1 600 words & fig.)

1932 **62. (01**
Engineering News-Record, No. 12, September 22, p. 353.
KOMMERS (Prof. J. B.). — **Understressing and notch sensitiveness in fatigue.** (2 500 words.)

1932 **55 & 62. (01**
Engineering News-Record, No. 13, September 29, p. 365.
TERZAGHI (Dr. K.). — **Record earth-pressure testing machine.** (3 500 words & fig.)

Indian Railway Gazette. (Calcutta.)

1932 **656 .1 & 656 .2**
Indian Railway Gazette, August, p. 180.
Modern railway practice and development, regulation of road transport. (2 500 words.)

1932 **656 .225**
Indian Railway Gazette, August, p. 182.
Containers, efficient link between road and rail. (2 500 words.)

1932 **621 .335 (.47) & 621 .43 (.47)**
Indian Railway Gazette, August, p. 186.
The **Diesel-electric locomotive** in **Russia.** New form of traction. (2 500 words.) (To be continued.)

Journal, Institution of Engineers, Australia. (Sydney.)

1932 **621 .31**
Journal of the Institution of Engineers, Australia, August, p. 261.
NOLAN (D .J.). — The principles of **power station operation** and their application (Bunnerong). (1 500 words & fig.)

Mechanical Engineering. (New York.)

1932 **621 .31**
Mechanical Engineering, October, p. 695.
ALLNER (F. A.). — **Hydroelectric developments and the correlation of hydro and steam power.** (4 500 words & fig.)

1932 **65**
Mechanical Engineering, October, p. 711.
LIVINGSTONE (R. T.). — **Control of operating expenses.** An application of **statistical methods.** (6 000 words & fig.)

Modern Transport. (London.)

1932 **625 .4 (42)**
Modern Transport, No. 705, September 17, p. 3.
London **Underground Railway development.** Completion of Finsbury Park to Arnos Grove section. (4 500 words & fig.)

1932 **385 .13 (.42)**
Modern Transport, No. 705, September 17, p. 5.
Valuation of railways. (2 500 words.)

1932 **656 .212.6 (.42) & 656 .213 (.42)**
Modern Transport, No. 705, September 17, p. 7.
Mechanical coal-handling at Dover Harbour. (1 300 words & fig.)

1932 **656 .211.5**
Modern Transport, No. 705, September 17, p. 8.
FALSHAW MORKILL (R.). — **Train-starting device.** Metropolitan Railway development. (800 words & fig.)

1932 **656 .1 (.42) & 656 .2 (.42)**
Modern Transport No. 706, September 24, p. 2.
The **road hauliers' statement.** (1 100 words.)

1932 **625 .234 (.73)**
Modern Transport, No. 706, September 24, p. 3.
Air-conditioned trains in the United States. (4 500 words & fig.)

1932 **621 .332 (.42)**
Modern Transport, No. 706, September 24, p. 5.
Picadilly railway extension. **The rectifier substations.** (2 400 words & fig.)

1932 **656 .29**
Modern Transport, No. 706, September 24, p. 7.
Sir GORDON HEARN. — Methods of **attracting passenger traffic.** (1 700 words.)

1932 **656 .1 (.42) & 656 .2 (.42)**
Modern Transport, No. 706, September 24, p. 8.
Road Haulage Association and the Salter report. **« Unfair preference to Railway interests. »** (2 200 words.)

1932 **656 .254 (.42)**
Modern Transport, No. 707, October 1, p. 3.
Carrier current telephony on L. M. S. R. (5 000 words & fig.) (To be continued.)

1932 **625 .175 (.42)**
Modern Transport, No. 707, October 1, p. 8.
Track inspection on the L. N. E. R. **Introduction of the speedster.** (350 words & fig.)

1932 **621 .13 (0**
Modern Transport, No. 707, October 1 p. 9,
LELEAN (W. A.). — **The standardisation of locomotives.** (2 000 words & fig.)

1932 **621 .43 (.54)**
Modern Transport, No. 708, October 8, p. 3.
Oil-engined railcars for India (1 850 words & fig.)

1932 **656 .254 (.42)**
Modern Transport, No. 708, October 8, p. 5.
Carrier current telephony on L. M. S. R. (2 000 words & fig.)

1932 **656 .1 (.42) & 656 .2 (.42)**
odern Transport, No. 708, October 8, p. 12.
BECKETT (J.). — **Motor vehicles and highway costs.** nfair recommendations of Salter report. (2 500 words.)

1932 **656 .1 (.42) & 656 .2 (.42)**
odern Transport, No. 708, October 8, p. 13.
Road-rail conference. (3 800 words.)

1932 **656 .253 (.42)**
odern Transport, No. 709, October 15, p. 5.
Signalling on the Southern Railway. (650 words & g.)

1932 **656 .1 (.42) & 656 .2 (.42)**
odern Transport, No. 709, October 15, p. 6.
Burdens of railway management. (2 400 words.)

1932 **621 .138.3 (.42)**
odern Transport, No. 709, October 15, p. 7.
Locomotive wheel drops. (900 words & fig.)

1932 **656 .1 (.42) & 656 .2 (.42)**
odern Transport, No. 709, October 15, p. 8.
Road-rail controversy. — Views of the traders. (2 000 ords.)

Railway Age. (New York.)

1932 **624 (.71)**
ailway Age, No. 11, September 10, p. 355.
Unusual concrete bridges are built on the Canadian ational. (3 800 words & fig.)

1932 **621 .139**
ailway Age, No. 11, September 10, p. 361.
Principles and problems of **railway supply work.** 700 words & fig.)

1932 **621 .136 (.42)**
ailway Age, No. 11, September 10, p. 365.
A British **self-trimming tender coal bunker.** (600 ords & fig.)

1932 **625 .234 (.73)**
ailway Age, No. 11, September 10, p. 367.
New Haven applies **air conditioning to diners.** (1 400 ords & fig.)

1932 **621 .135.2 (.73)**
ailway Age, No. 13, September 24, p. 241.
BRUNNER (H. E.) and TAYLOR (B. W.). — New ork Central **locomotive No. 5343 makes over 130 000** iles. (3 300 words & fig.)

1932 **656 .1 (.73) & 656 .2 (.73)**
ailway Age, No. 13, September 24, p. 425.
Governor Roosevelt on Railroads. (4 300 words.)

1932 **725 .33 (.73)**
ailway Age, No. 13, September 24, p. 428.
KIRKBRIDE (W. H.). — Developing a **water supply** **arid country.** (2 800 words & fig.)

1932 **656 .2 (.73)**
Railway Age, No. 13, September 24, p. 435.
Minnesota **ship-by-rail Association formed.** (3 800 words.)

1932 **656 .1 (.73)**
Railway Age, No. 13, September 24, p. 439.
WHEELER (W. A.). — The Maine Central's **highway operations.** (2 700 words & fig.)

1932 **625 .244 (.73)**
Railway Age, No. 14, October 1, p. 458.
WIGNEY (H. M.). — **Mechanically refrigerated railroad freight cars.** (3 000 words & fig.)

1932 **385. (71)**
Railway Age, No. 14, October 1, p. 471.
Report on Canadian Railroads. (3 000 words.)

1932 **656 .253 (.42)**
Railway Age, No. 14, October 1, p. 473.
British pooling plan approved. (3 400 words.)

1932 **625 .111 (.73)**
Railway Age, No. 15, October 8, p. 494.
A new approach to the **grade separation problem.** (3 000 words & fig.)

1932 **656 .2 (.73)**
Railway Age, No. 15, October 8, p. 498.
Employees plan **extension of ship-by-rail movement.** (750 words.)

1932 **625 .245 (.73)**
Railway Age, No. 15, October 8, p. 501.
Railway express agency **end-door cars** are **modernized.** (1 000 words & fig.)

1932 **625 .213**
Railway Age, No. 15, October 8, p. 507.
Spring plate requires no belt. (350 words & fig.)

Railway Engineer. (London.)

1932 **621 .43 (.42)**
Railway Engineer, October, p. 351.
British oil engines for rail traction. (2 200 words & fig.)

1932 **625 .172 (.944)**
Railway Engineer, October, p. 354.
CARDEW (C. A.). — New method of **automatically locating vertical defects in permanent way.** (4 200 words & fig.)

1932 **625 .175 (.42)**
Railway Engineer, October, p. 360.
Petrol-driven cars for track maintenance service. (1 000 words & fig.)

1932 **621 .132.8 (.56)**
Railway Engineer, October, p. 362.
New **steam railcars** for the Turkish State Rys. (600 words & fig.)

1932 **625 .13 (.42)**
Railway Engineer, October, p. 364.
Notable **bridge reconstructions** on the London Midland & Scottish Ry. (600 words & fig.)

1932 **656 .212.6**
Railway Engineer, October, p. 365.
Mobile trucks for railway use. (1 200 words & fig.)

1932 **691**
Railway Engineer, October, p. 367.
Protected steel sheeting. (450 words.)

1932 **621 .132.5 (.42)**
Railway Engineer, October, p. 370.
New **2-8-4 type locomotives,** South Australian Railways. (800 words & fig.)

1932 **621 .335 (.44)**
Railway Engineer, October, p. 371.
Accumulator traction on French light railways. (3 500 words & fig.)

1932 **621 .91 (.42)**
Railway Engineer, October, p. 375.
A remarkable British-built **machine tool.** (1 300 words & fig.)

Railway Gazette. (London.)

1932 **656 .222.6 (.42)**
Railway Gazette, No. 12, September 16, p. 325.
London & North Eastern Ry. **fast freight train services.** (600 words & fig.)

1932 **621 .43 (.43) & 625 .212 (.43)**
Railway Gazette, No. 12, September 16, p. 335.
Railway wheels with rubber centres. (350 words & fig.)

1932 **385. (09 .1 (.71)**
Railway Gazette, No. 12, September 16, p. 339.
The Hudson Bay railway. (2 500 words & fig.)

1932 **621 .332**
Railway Gazette, No. 13, September 23, p. 365.
High-speed circuit-breakers. (2 400 words & fig.)

1932 **656 .254 (.42)**
Railway Gazette, No. 13, September 23, p. 367.
Teleprinter circuits. (700 words.)

1932 **625 .232 (.73)**
Railway Gazette, No. 13, September 23, p. 369.
New type of **double-deck railway carriage.** (400 words & fig.)

1932 **659**
Railway Gazette, No. 13, September 23, p. 371.
GRASEMANN (C.). — « To let or not to let, that is the question. » (1 600 words & fig.)

1932 **656 .211.7 (.45)**
Railway Gazette, No. 14, September 30, p. 395.
Italy. — **Diesel train ferries.** (1 000 words & fig.)

1932 **656 .233 (.42)**
Railway Gazette, No. 14, September 30, p. 397.
Two new **pooling schemes.** (1 800 words.)

1932 **621 .95 (.42) & 625 .144.4 (.42)**
Railway Gazette, No. 14, September 30, p. 399.
An **oxygen hole-cutting machine.** (500 words & fig.)

1932 **656 .225 (.42)**
Railway Gazette, No. 14, September 30, p. 401.
Efficient **handling of special goods traffic.** (1 600 words & fig.)

1932 **656 .215 (.42)**
Railway Gazette, No. 14, September 30, p. 403.
Railway lighting. Goods yard and sheds. (1 300 words & fig.)

1932 **656 .256.3 (.82)**
Railway Gazette, No. 14, September 30, p. 407.
Automatic signalling on the Central Argentine Railway. (1 300 words & fig.)

1932 **693 & 721 .5**
Railway Gazette, No. 14, September 30, p. 410.
Economic **roof repairing.** (800 words & fig.)

1932 **656 .282 (.42)**
Railway Gazette, No. 14, September 30, p. 414.
Railway **accident report.** Dagenham Dock, London Midland & Scottish Ry.; December 18, 1931. (1 000 words.)

1932 **656 .253 (.42)**
Railway Gazette, No. 15, October 7, p. 427.
The **re-signalling** of Wembley Park Station **Metropolitan Railway.** (1 300 words & fig.)

1932 **621 .335 (.42)**
Railway Gazette, No. 15, October 7, p. 431.
New Swiss **electric locomotives.** (1 000 words & fig.)

1932 **621 .335 (.54) & 621 .43 (.54)**
Railway Gazette, No. 15, October 7, p. 435.
Four **Diesel-electric railcars** for India. (2 300 words & fig.)

1932 **621 .43**
Railway Gazette, No. 15, October 7, p. 438.
HEINZE (E. P. A.). — The Deckel **fuel injection pump.** (1 200 words & fig.)

1932 **621 .335 (.43) & 621 .43 (.43)**
Railway Gazette, No. 15, October 7, p. 441.
German **high-speed Diesel railcar.** (300 words & fig.)

1932 **625 .4 (.42)**
Railway Gazette, No. 16, October 14, p. 455.
Underground goods railway for London. (1 100 words.)

1932 621 .43 (.42)
ilway Gazette, No. 16, October 14, p. 456.
A new Southern Railway **rail-bus.** (700 words & fig.)

1932 698
ilway Gazette, No. 16, October 14, p. 457.
New **portable paint spraying plant.** (600 words & g.)

1932 625 .142.3 (.42)
ilway Gazette, No. 16, October 14, p. 459.
A new **steel sleeper.** (600 words & fig.)

1932 657
ilway Gazette, No. 16, October 14, p. 460.
LEE (R. E. B.). — Reliable and economical **freight counting.** (2 400 words & fig.)

1932 625 .13 (.54)
ilway Gazette, No. 16, October 14, p. 463.
Rupnarain **bridge doubling,** Bengal-Nagpur Ry. (1 500 ords & fig.))

roceedings, American Society of Civil Engineers (New York.)

1932 621 .392 & 721 .3
oc., Amer. Soc. Civil Eng., September, p. 1147.
SLATER (W. A.) and FULLER (M. O.). — **Tests riveted and welded steel columns.** (12 000 words & g.)

1932 624 .8 (.73)
oc., Amer. Soc. Civil Eng., September, p. 1181.
KIRKBRIDE (W. H.). — The Martinez-Benicia idge. (9 000 words & fig.)

1932 624 .2
oc., Amer. Soc. Civil Eng., September, p. 1217.
HUNTINGTON (W. C.), NIELSEN (P.), TORIG-NO (A.) and COPE (E. L.). — **Wind-bracing connecon efficiency.** (2 000 words & fig.)

1932 526
oc., Amer. Soc. Civil Eng., September, p. 1226.
LEMBERGER (O.). — **Sterco-topographic mapping.** 500 words & fig.)

1932 693
oc., Amer. Soc. Civil Eng., September, p. 1242.
DREYER (W.), SPAULDING (R. E.), BEYER (A.), SOLAKIAN (A. G.) and MEYER (L. L.). — **resses in reinforced concrete due to volume changes.** 000 words & fig.)

1932 624 .5
oc., Amer. Soc. Civil Eng., September, p. 1258.
PAVLO (E. L.), TUDOR (R. A.), CONSTANT (F.), DERLETH Jr. (C.), EREMIN (A. A.), OSGOOD C.), SPOFFORD (C. M.) and WILBUR (J. B.). — **spension bridges under the action of lateral forces.** 400 words & fig.)

Proceedings, Institution of Mechanical Engineers. (London.)

1932 621 .335
Proc., Inst. of Mec. Eng., January, p. 51.
TWINBERROW (J. D.). — The **mechanism of electric locomotives.** (30 000 words & fig.)

1932 62. (01 & 669 1.
Proc., Inst. of Mec. Eng., January, p. 209.
BARLEY (R. W.) and ROBERTS (A. M.). — **Testing of materials for service in high-temperature steam-plant.** (50 000 words & fig.)

1932 62. (01 & 669
Proc., Inst. of Mec. Eng., January, p. 285.
BARR (W.) and BARDGETT (W. E.). — An **accelerated test for the determination of the limiting creep stress of metals.** (2 500 words & fig.)

Transit Journal. (New York.)

1932 621 .336 (.73)
Transit Journal, October, p. 405.
Cadmium bronze trolley wire shows desirable qualities. (2 000 words & fig.)

1932 621 .33 (.73)
Transit Journal, October, p. 408.
Use of **one-man cars** extended in Brooklyn. (2 300 words & fig.)

1932 621 .43
Transit Journal, October, p. 411.
Pneumatic-tired rail vehicle developed in Austria. (500 words & fig.)

In German.

Archiv für Eisenbahnwesen. (Berlin.)

1932 656 .213
Archiv für Eisenbahnwesen, Mai-Juni, S. 553.
GIESE (Dr. K.). — Der **Hafenbahnvertrag** in Theorie und Praxis. (15 000 Wörter.)

1932 656 (.42)
Archiv für Eisenbahnwesen, Mai-Juni, S. 639.
GRETSCH (Dr. R.). — Die **einheitliche Verkehrsregelung** in England. (8 500 Wörter.)

1932 385. 113 (.492)
Archiv für Eisenbahnwesen, Mai-Juni, S. 667.
OVERMANN (Dr.). — Die **Niederländischen Eisenbahnen** im Jahr 1930. (4 500 Wörter.)

1932 385 .113 (.493)
Archiv für Eisenbahnwesen, Mai-Juni, S. 683.
Die **Nationale Gesellschaft der belgischen Eisenbahnen.** (4 000 Wörter.)

1932 **385 .113 (.45)**
Archiv für Eisenbahnwesen, Mai-Juni, S. 700.
Die **italienischen Staatsbahnen** im Rechnungsjahr 1929-1930. (5 000 Wörter.)

1932 **313 .385 (.494)**
Archiv für Eisenbahnwesen, Mai-Juni, S. 725.
Die **Eisenbahnen der Schweiz** im Jahr 1929. (1 000 Wörter.)

1932 **313 .385 (.52)**
Archiv für Eisenbahnwesen, Mai-Juni, S. 744.
Die **Eisenbahnen Japans** im Rechnungsjahr 1928-1929. (2 000 Wörter.)

1932 **625 .4 (.42)**
Archiv für Eisenbahnwesen, September-Oktober, S. 1113.
GRETSCH (Dr. R.). — Die Londoner Untergrund-bahn-Gruppe. (11 000 Wörter & Abb.)

1932 **388**
Archiv für Eisenbahnwesen, September-Oktober, S. 1189.
LEHNER (Dr. Ing. F.). — Die **Linienführung** innerstädtischer Verkehrsmittel. (8 000 Wörter & Abb.)

1932 **313 .385 (.73)**
Archiv für Eisenbahnwesen, September-Oktober, S. 1263.
Die **Eisenbahnen der Vereinigten Staaten** von Amerika in den Jahren 1929 und 1930. (5 500 Wörter & 1 Karte.)

Die Lokomotive. (Wien).

1932 **621 .43**
Die Lokomotive, Oktober, S. 177.
Triebwagen oder Schienen-Auto II.
Austro Daimler **Schnelltriebwagen.** (3 000 Wörter & Abb.) (Fortsetzung.)

Die Reichsbahn. (Berlin.)

1932 **656 .222.5 (.43)**
Die Reichsbahn, Nr. 23, S. 543.
BAUMGARTEN. — Der **Personenzugplan.** Seine Entwicklung und Bedeutung für die deutsche Wirtschaft. (8 Seiten, Zeichn. & Diagr.)

1932 **624**
Die Reichsbahn, Nr. 24, S. 565.
Über Fugen und Stimmauer **Abdichtungen bei massivbrücken.** (4 Seiten & Zeichn.)

1932 **385**
Die Reichsbahn, Nr. 26, S. 601.
BIELING. — **Eisenbahn und Konjunktur.** (5 Seiten.)

1932 **656 .222.1**
Die Reichsbahn, Nr. 27, S. 615.
EHRENSBERGER. — Belastungsangaben für **Dienstfahrpläne.** (4 1/4 Seiten.)

1932 **656 .212.**
Die Reichsbahn, Nr. 28, S. 635.
DIEDRICHS. — **Zusammenschiebbare Laderampen** zur Beschleunigung des Ladegeschäfts bei den leichten Güterzügen. (7 Seiten, Zeichn. & Abb.)

1932 **656 .25**
Die Reichsbahn, Nr. 29, S. 654.
FROHN. — Sind **Zugleitungen** und Oberzugleitungen auch bei schwächterum Verkehr nötig. (3 1/2 Seiten.

1932 **656 .22**
Die Reichsbahn, Nr. 30, S. 671.
TECKLENBURG. — Gestaltung des **Güterzugfahrplans** für den Verkehr in der Nahzone. (7 1/2 Seiten & Zeichn.)

1932 **656 .2**
Die Reichsbahn, Nr. 31, S. 692.
STEINBRINK. — **Bahnhofsbauten** einst und jetzt (7 Seiten, Zeichn. & Abb.)

1932 **385 (.42**
Die Reichsbahn, Nr. 32, S. 707.
HARDT. — Die **englischen Eisenbahnen** in Verkehrskampf. (6 1/2 Seiten.)

1932 **656 .22**
Die Reichsbahn, Nr. 34, S. 739.
TECKLENBURG. — **Unterwegs- Aufenthaltszeiten** der Nahgüterzüge. (5 Seiten.)

1932 **625 .13 (.43.**
Die Reichsbahn, Nr. 36, S. 771.
STRASSER. — **Maschinelle Gleis- und Bettungserneuerung** im Cochemer Tunnel. (9 1/2 Seiten, Zeichn. Abb. & Diagr.)

1932 **656 .23**
Reichsbahn, Nr. 38, S. 806.
RUSS. — Die monatlichen Prüfzahlen nach der **Betriebskostenrechnung.** (7 Seiten & Diagr.)

Elektrische Bahnen. (Berlin.)

1932 **621 .33 (.43**
Elektrische Bahnen, September, S. 197.
TETZLAFF (Ing. H.). — Das **elektrische Bahnwesen** in der deutschen Eisenbahn-Bau- und Betriebsordnung. (4 000 Wörter.)

1932 **621 .33 (.493**
Elektrische Bahnen, September, S. 203.
SCHMITT (H.). — **Elektrisierungspläne** in Belgien (700 Wörter.)

Glasers Annalen. (Berlin.)

1932 **621 .138.1 (.431**
Glasers Annalen, Heft 6, 15 September, S. 47.
SCHMELZER (A. D.). — Der neue **Lokomotivschuppen** auf dem Verschiebebahnhof Tempelhof. (3 00 Wörter & Abb.) (Schluss folgt.)

1932 **621 .138.1 (.431)**
Glasers Annalen, Heft 7, 1. Oktober, S. 55.
SCHMELZER (A. D.). — Der neue **Lokomotivschuppen auf dem Verschiebebahnhof Tempelhof.** (3 000 Wörter & Abb.) (Schluss.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1932 **625 .215**
Organ für die Fortschritte des Eisenbahnwesens, Heft 19, 1. Oktober, S. 355.
HEUMANN (Prof. Dr. Ing.). — **Bogenlauf** vierachsiger Eisenbahnwagen. (10 000 Wörter, Tabellen & Abb.) (Schluss.)

1932 **625 .143**
Organ für die Fortschritte des Eisenbahnwesens, Heft 19, 1. Oktober, S. 368.
v. SANDEN (H.). — Über die Wirkung von **Wärmespannungen im Eisenbahngleis.** (2 000 Wörter & Abb.)

1932 **621 .135.2 & 625 .212**
Organ für die Fortschritte des Eisenbahnwesens, Heft 20, 15 Oktober, S. 375.
SCHECK (Ing. R.). — Über das Aufschrumpfen von **Radreifen.** (4 500 Wörter & Abb.) (Schluss.)

Verkehrstechnische Woche. (Berlin.)

1932 **621 .138.5**
Verkehrstechnische Woche, Nr. 23, S. 339.
RASCH. — Die Ausgestaltung der **Lokomotivbehandlungsanlagen.** (3 Seiten, Zeichn. & Abb.)

1932 **656 .212.5**
Verkehrstechnische Woche, Nr. 23, S. 344; Nr. 24, S. 369; Nr. 25, S. 381; Nr. 26, S. 390; Nr. 27, S. 405; Nr. 28, S. 419; Nr. 29, S. 437.
SCHMITZ. — Wesen und Aufbau der **selbsttätigen Weichenstellung** in der Ablaufanlagen der **Verschiebebahnhöfe.** (29 Seiten, Abb. & Zeichn.)

1932 **385 (.43)**
Verkehrstechnische Woche, Nr. 25, S. 373.
WOLF. — **Reichsbahn und Internationaler Verkehr.** Nach einem Vortrag, gehalten in Berlin am 7 März 1932 anlässlich der Studienkonferenz für Hochschulprofessoren. (8 Seiten.)

1932 **385 (.498)**
Verkehrstechnische Woche, Nr. 26, S. 385.
Die **Stabilisierung** der rumänischen Eisenbahnen. (5 Seiten.)

1932 **656 .212.5**
Verkehrstechnische Woche, Nr. 28, S. 413.
AMMANN. — Das **Zulaufprofil** selbsttätiger Ablaufanlagen. (6 1/2 Seiten & Diagr.)

1932 **656 .222**
Verkehrstechnische Woche, Nr. 28, S. 423.
UHLICH. — **Vorsprungstafel-Abstandtafel** für Züge. (3 Seiten.)

1932 **656 .232**
Verkehrstechnische Woche, Nr. 29, S. 429.
RISCH. — **Förderkostengleichungen** und günstigste Massenverteilung. (1 1/2 Seiten & Diagr.)

1932 **656 .212.5**
Verkehrstechnische Woche, Nr. 29, S. 431; Nr. 32, S. 471.
M LLER. — Das **Zulaufprofil** selbsttätiger Ablaufanlagen. (2 1/2 Seiten.)

1932 **625 .258**
Verkehrstechnische Woche, Nr. 30, S. 441.
SCHMIDT. — **Einheitshemmschuh und Hemmschuhwagen.** (7 Seiten, Abb. & Diagr.)

1932 **656 .212.5**
Verkehrstechnische Woche, Nr. 30, S. 448.
AMMANN. — Das **Zulaufprofil** selbsttätiger Ablaufanlagen. (2 Seiten.)

1932 **621 .43 (.73)**
Verkehrstechnische Woche, Nr. 31, S. 462.
FRIEDRICH. — Amerikanische **Verbrennungsmotortriebwagen.** (2 1/4 Seiten.)

1932 **656 (.43)**
Verkehrstechnische Woche, Nr. 32, S. 465.
MÜLLER. — Erhaltung oder Vernichtung der Substanz in deutschen **Nahverkehrswesen.** (6 Seiten.)

1932 **656 .211 (.431)**
Verkehrstechnische Woche, Nr. 33, S. 477.
HÜLSENKAMP. — Zum **Umbau des Bahnhofs** Alexanderplatz (1929-1932). (15 Seiten, Zeichn., Abb., Diagr. & Karten.)

1932 **621 .138**
Verkehrstechnische Woche, Nr. 34, S. 499; Nr. 35, S. 514.
SCHWERING. — **Lokomotiv- Unterhaltungs- Kosten** in ihrer Anpassung an Betriebsschwankungen. (6 1/2 Seiten & Diagr.)

1932 **385 .15 (.44)**
Verkehrstechnische Woche, Nr. 34, S. 502.
NIEDERDRÄING. — Auf dem Wege zur **Verstaatlichung** der französischen Eisenbahnen. (3 Seiten.)

1932 **625 .151**
Verkehrstechnische Woche, Nr. 35, S. 509.
KOMMERELL. — Berechnung der erforderlichen kleinsten Gleisabstände und der kleinsten Abstände von festen Gegenständen bei **Abzweigung von Weichen** aus geraden und gekrümmten Stammgleisen. (5 Seiten & Zeichn.)

1932 **625 .151**
Verkehrstechnische Woche, Nr. 36, S. 525; Nr. 37, S. 542.
NIEMANN. — Vermehrte **Anwendung schlanker Weichen,** ihre Vorteile im Betriebe und auf wirtschaftlichem Gebiet. (10 Seiten, Zeichn. & Abb.)

1932 **624 (.431)**
Verkehrstechnische Woche, Nr. 37, S. 537; Nr. 38, S. 553.
ZABEL. — Bemerkenswerte **Brückenneubauten** auf dem Nordring der Berliner S-Bahn. (9 Seiten, Zeich. & Abb.)

1932 **656 .211 (.45)**
Verkehrstechnische Woche, Nr. 38, S. 550.
BLUMM. — Der **Hauptbahnhof** von Mailand. Eine kritische Studie. (4 Seiten.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1932 **621 392**
Zeitschrift des Vereines deutscher Ingenieure, Nr. 39, 24 September, S. 931.
BRAUNFISCH (Ing. J.). — Gestaltung **geschweisster Körper.** (2 500 Wörter & Abb.)

1932 **624 .5**
Zeitschrift des Vereines deutscher Ingenieure, Nr. 39, 24 September, S. 939.
BLICK (Ing. W.). — Formänderungen und statische Funktionen bei versteiften **Hängebrücken.** (5 000 Wörter & Abb.)

1932 **625 .245**
Zeitschrift des Vereines deutscher Ingenieure, Nr. 40, 1. Oktober, S. 959.
BIECK (Ing. H.). — Neuerungen im **Güterwagenbau.** (3 500 Wörter & Abb.) (Schluss folgt.)

1932 **62. (01**
Zeitschrift des Vereines deutscher Ingenieure, Nr. 41, 8. Oktober, S. 973.
DIETRICH (Ing. O.) und LEHR (Dr.-Ing. E.). — Das **Dehnungslinienverfahren** ein Mittel zur Bestimmung der für die Bruchsicherheit bei Wechselbeanspruchung massgebenden **spannungsverteilung.** (6 000 Wörter & Abb.)

1932 **625 .245**
Zeitschrift des Vereines deutscher Ingenieure, Nr. 43, 22 Oktober, S. 1053.
BIECK (Ing. H.). — Neuerungen im **Güterwagenbau.** (4 500 Wörter & Abb.) (Schluss.)

Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1932 **656 .254**
Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen, Nr. 40, 6. Oktober, S. 837.
GLÄSEL (Dr.-Ing.). — Beitrag zu der Frage : **Zugbeeinflussung** mit mechanischer Ubertragung. (1 000 Wörter & Abb.)

1932 **625 .245 (.43) & 656 .225 (.4**
Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen, Nr. 41, 13. Oktober, S. 857.
BECKER. — Der **Behälterverkehr** der Deutsch Reichsbahn. Die neue « Dienstvorschrift über d Behälterverkehr ». (6 500 Wörter.)

1932 **656 .2**
Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen, Nr. 41, 13. Oktober, S. 865.
SCHULZE (M.). — Beeinflussung von **Fernmeld anlagen** durch Starkstromanlagen. (2 000 Wörter Abb.)

1932 **656 .2**
Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen, Nr. 42, 20. Oktober, S. 879.
KÜMMELL (Dr.-Ing.). — **Wegeübergänge** und **Fah geschwindigkeit** auf Nebenbahnen. (7 000 Wörter Abb.)

In Spanish.

Revista de Ingenieria Industrial. (Madrid.)

1932 **625 .4 (.46**
Revista de Ingenieria Industrial, nº 27, agosto, p. 26
REYES (Ing. F.). — El « **Metro** » Transversal Barcelona. (2 000 palabras & fig.)

Revista de Obras Públicas. (Madrid.)

1932 **624 .6 (**
Revistas de Obras Publicas, nº 20, 15 de octubr p. 470.
FERNANDEZ CASADO (C.). — **Teoria del arc** (3 500 palabras & fig.)

Anales de la Asociacion de Ingenieros del I. C. A. I. (Madrid.)

1932 **625 .**
Anales de la Asociacion de Ingenieros del I. C. A. nº 92, 8 de agosto, p. 462.
MATINOT (Ing. L. F.). — Método especial de tr bajo en la perforación de **túneles.** (2 000 palabras fig.)

Ingenieria y Construcción. (Madrid.)

1932 **656 .1 & 656**
Ingenieria y Construcción, nº 116, agosto, p. 417.
Medios que en los ferrocarriles se proyectan o e plean para contrarrestar la **competencia** o encauzar tráfico. (5 500 palabras.) (Continuará.)

In Italian.

L'Ingegnere. (Roma.)

1932 **691**
Ingegnere, settembre, p. 651.
GUSSONI (Dott. Ing. L.). — Studi e ricerche sul mento armato alla scuola di specializzazione del Poli-nico di Milano. (4 500 parole & fig.)

Notiziario tecnico. (Firenze.)

1932 **621 .33 (.45)**
otiziario tecnico, ottobre, p. 260.
La elettrificazione della spezia-Fornovo. (2 500 pa-le & fig.)

Rivista tecnica delle ferrovie italiane. (Roma.)

1932 **621 .33 (.45)**
vista tecnica delle ferrovie italiane, 15 settembre, p. 139.
PIROLI (D.). — La ferrovia Rimini-S. Marino. 000 parole, Karta, Tavola & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1932 **621 .332**
Ingenieur, Nr 41, 7 Oktober, p. 95.
VAN DOOREN (P. H. E.). — Bovengrondsche lei-ngen voor spoor- en tramwegen. (2 500 woorden & r.)

Spoor- en Tramwegen. (Utrecht.)

1932 **621 .43 (.73)**
oor- en Tramwegen, Nr 7, 27 September, p. 167.
CORPORAAL (Ir. H. E.). — Amerikaansche Exploi-tie van Motorrijtuigen. (2 500 woorden & tabellen.) lot.)

1932 **656 .256.3 (.492)**
oor- en Tramwegen, Nr 7, 27 September, p. 173.
VERSTEGEN (Ir. J. H.). — Automatisch Blockstel-l op de Nederlandsche Spoorwegen. (2 000 woorden tafereelen.) (Vervolg.)

1932 **656 .256.3 (.492)**
oor- en Tramwegen, Nr 8, 11 Oktober, p. 199.
VERSTEGEN (Fr. J. H.). — Automatisch Blockstel-l op de Nederlandsche Spoorwegen. (3 500 woorden tafereelen.)

In Polish.
(= 91.885)

Inżynier Kolejowy. (Warsaw.)

1932 **625 .143.2 = 91 .885**
Inzynier kolejowy, No. 7, p. 155
KORNACZEWSKI. — The necessary **hardness of the head of rails.** (2 600 words & fig.)

1932 **656 .254 (.438) = 91 .885**
Inzynier kolejowy, No.7, p. 157.
CHRZANOWSKI. — **Automatic cab signals** (tested on the Polish State Railways). (1 950 words & fig.)

1932 **385 .4 (.438) = 91 .885**
Inzynier kolejowy, No. 8, p. 171.
Organisation of the Polish Ministry of Communications as regards railways. (8 450 words.)

1932 **625 .24 = 91 .885 & 621 .392 = 91 .885**
Inzynier kolejowy, No. 9, p. 198.
TULACZ & GOLLING. — **Application of welding to wagon building.** (3 250 words & fig.)

In Serbian.
(= 91.882)

Saobraćajni pregled. (Belgrad.)

1932 **621 .13 = 91 .882 & 621 .43 = 91 .882**
Saobracajni pregled, No. 6, p. 233.
STANKOVIC. — Have **rail motor cars** really the advantage over **light steam locomotives ?** (4 950 words.)

1932 **621 .131.1 = 91 .882**
Saobracajni pregled, No. 6, p. 238.
ERMENC. — **Locomotive efficiency** in service. (4 500 words & fig.)

1932 **656 .25 (0 (.497.1) = 91 .882**
Saobracajni pregled, No. 6, p. 248.
RJEPIC. — The Jugoslav **signalling code** (as from the 1 April 1932). (4 050 words.)

1932 **656 .22 (.497.1) = 91 .882**
Soabracajni pregled, No. 7, p. 290.
RJEPIC. — **Train meeting** (new **regulations** on the Jugoslav State Railways). (5 400 words & fig.)

1932 **621 .133.1 = 91 .882**
Saobracajni pregled, No. 7, p. 303.
JAKOVLEVIDZ. — Organisation of the **locomotive coal purchasing service.** (1 800 words.)

1932 **625 .111 (.497.1) = 91 .882**
Saobracajni pregled, No. 8, p. 337.
STEHLIK. — New regulations regarding **standard track clearance gauges.** (6 300 words & fig.)

1932 **656 .222 = 91 .882**
Saobracajni pregled, Nos. 8 and 9, p. 350 and 395.
REPIC. — **Train intervals and train overtakings.** (10 800 words & fig.)

1932 **625 .17 = 91 .882**
Saobracajni pregled, No. 8, p. 374.
NIKOLIDZ. — **The effect of very low temperatures on the permanent way.** (Summary of the Polish and Rumanian reports to the U. I. C. (Intern. Ry. Union). (900 words.)

1932 **385 (.438) = 91 .882**
Saobracajni pregled, No. 8, p. 377.
NIKOLIC. — Difficulties encountered in the **industrialisation of the Polish State Railways.** (900 words.)

1932 **621 .134.2 = 91 .882**
Saobracajni pregled, No. 9, p. 385.
JOVIN-GREBENAROVIC. — **The Heusinger-Walschaerts system of valve gear. Regulation of the valve gear.** (9 000 words & fig.)

1932 **656 .223.2 = 91 .882**
Saobracajni pregled, No. 9, p. 401.
DOLINAR. — **Allocation of freight rolling stock and calculation of the turn-round period of freight rolling stock** on the Bulgarian, Egyptian, Greek, Polish, Rumanian, Czechoslovakian and Jugoslav Railways. (5 400 words.)

1932 **656 .223.2 = 91 .882**
Saobracajni pregled, No. 9, p. 429.
SAJOVIN. — **Indemnification for carriages and vans used in international traffic.** (2 250 words.)

In Czech.

(= 91.886)

Zeleznični Revue. (Prague.)

1932 **656 .224 (.437) = 91 .886**
Zeleznicni Revue, No. 13 and 14, p. 193 and 213.
HUSAK. — The **railways and the post office** in Czechoslovakia (**Regulations** of the Czechoslovakian Post Office.) (3 500 words.)

1932 **625 .5 (.437) = 91 .886**
Zeleznicni Revue, No. 16, p. 245.
NEVRLY. — **A ropeway** near Teplice-Sanov. (1 050 words.)

Zprávy železničních inženýrů. (Prague.)

1932 **621 .131.1 = 91 .886**
Zprávy zeleznicních inzenyrů, No. 6, p. 103.
KOREF. — **Nomograms used in locomotive calculations.** Determination of the **adhesion coefficient.** (5 500 words & fig.)

1932 **625 .17 (.437) = 91 .886**
Zprávy zeleznicních inzenyrů, No. 6, p. 111.
HAUER. — The introduction, as a trial, of **industrial management in the permanent way maintenance** on the Czechoslovakian State Railways. (3 300 words.)

1932 **656 .2 (.73) = 91 .886**
Zprávy zeleznicních inzenyrů, No. 7 and 8, p. 119 and 134.
PETRVALSKY. — **Relations between the public and the railways** in the U. S. A. and their organisation for attracting customers to the railways. (11 000 words.)

1932 **621 .134.5 = 91 .886**
Zprávy zeleznicních inzenyrů, No. 8.
WOLF. — **Calculation of the oil consumption for locomotive cylinder lubrication.** (2 200 words & fig.)

1932 **656 .254 (.437) = 91 .886**
Zprávy zeleznicních inzenyrů, No. 9, p. 152.
KOZESNIK. — **Selector telephones** connecting the various services in the Bratislava **shunting yard.** (6 600 words & fig.)

1932 **621 .133.3 = 91 .886**
Zprávy zeleznicních inzenyrů, No. 9, p. 160.
KÖSZEG. — The stresses sustained by locomotive boiler stays. (2 750 words & fig.)

13.703. — M. Weissenbruch Co., Ltd., Printer of the King, 49, rue du Poinçon, Bruxelles.

MONTHLY BIBLIOGRAPHY OF RAILWAYS (1).

PUBLISHED UNDER THE SUPERVISION OF

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[016 .385. (02]

I. — BOOKS.

In French.

1932 385. (02

Annuaire 1932-1933 de la Chambre Syndicale des abricants et des Constructeurs de matériel pour cheins de fer et tramways.

Chambre Syndicale, 7, rue de Madrid, Paris, 8e. Un olume (13 × 22 cm.), 340 pages. (Prix : 20 francs.)

1932 625 .11

AGOT (J.).

Tracé des voies de chemins de fer.

Premier fascicule. Traité pratique de calcul rapide. Lyon, Marc Camus, 3, avenue de la Bibliothèque. Prix : 10 francs français.)

1932 621 .43

RANCO (Prof. I.) et LABRYN (P.).

Locomotives et automotrices à moteurs à combustion nterne.

Paris et Liége, Librairie polytechnique, Ch. Béranger. In volume in-8° (18 × 25 cm.), 268 pages, 185 figures. Prix : 75 francs français.)

1932 621 .3 (02

JANET (P.).

Leçons d'électrotechnique générale professées à Ecole supérieure d'Electricité.

Lyon, Marc Camus. Un volume (25 × 16 cm.), 530 ages avec 210 figures. (Prix : 80 francs français.)

1932 691 & 721 .9

MAGNY (A. V.).

La construction en béton armé.

Paris et Liége, Librairie polytechnique, Ch. Béranger. In volume in-8° raisin (16 × 20 cm.), 719 pages, 473 igures et atlas de 33 planches. (Prix : 210 francs rançais.)

1932 656. (02

IAISON (F.).

Exploitation technique des chemins de fer.

Paris et Liége, Librairie polytechnique, Ch. Béranger. In volume, 372 pages, figures et tableaux.

1932 62. (01

NACHTERGAL (A.).

Aide-mémoire de résistance des matériaux.

Bruxelles, A. de Boeck, Paris, Ch. Béranger. Un volume de 692 pages avec 878 figures. (Prix : 125 francs.)

In German.

1932 385. (02 (.43)

BAUMANN (Dr.-Ing. Dr. rer. pol. H.).

Deutscher Reichsbahnkalender 1933.

Leipzig C 1, Konkordia Verlag. (Preis : 3.60 R.M.)

1932 621 .392 & 721 .9

GREGOR (A.).

Der praktische Stahlhochbau. IV. Band : Geschweisste Stahlbauten.

Berlin-Charlottenburg, 1932, Robert Kiepert. 1 Band von 129 Seiten. (Preis : 18.20 R.M.)

1932 721 .9

KERSTEN (C.).

Der Stahlhochbau.

Berlin 1932, Wilhelm Ernst und Sohn. 1 Band. (Preis: Geheftet 18 R.M., Leinen 19.50 R.M.)

1933 621 .138.5 (.43), 625 .19 (.43) & 625 .26 (.43)

KÜHNE (P.).

Erhaltungswirtschaft bei der deutschen Reichsbahn.

Berlin, Verkehrswissenschaftliche Lehrmittelgesellschaft m. b. H. bei der deutschen Reichsbahn. 1 Band, 512 Seiten, Tabellen, Tafeln & Abbildungen.

1932 691 (.43)

LOSER (B.).

Bemessungsverfahren.

Berlin 1932. Verlag von Wilhelm Ernst und Sohn. (Preis : 6.50 R.M.)

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress conjointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway Science », by L. WEISSENBRUCH, in the number for November 1897, of the *Bulletin of the International Railway Congress*, p. 1509).

1932 621 .392

MELLER (K.).

Elektrische Lichtbogenschweissung.

Leipzig, Johann Ambrosius Barth, Brüssel, Librairie Falk Fils. 1 Band von 398 Seiten mit 374 Abbildungen und 31 Zahlentafeln. (Preis : 26 R.M., Lw. 27.80 R.M.)

1932 721 .9

MÖRSCH (E.).

Bemessungstafeln für das Entwerfen von Eisenbetonbauten.

Stuttgart 1932, Konrad Wittver. 1 Band, 41 Tafeln. (Preis : 12 R.M.).

1932 624. (02

SCHAU (A.).

Der Brückenbau.

Leipzig, Johann Ambrosius Barth, Brüssel, Librairie Falk Fils. 1 Band von 230 Seiten mit 464 Abbildungen und 8 Tafeln. (Preis : 6.20 R.M.)

1932 62. (02

UHLAND (W. H.).

Uhlands Ingenieur Kalender.

Leipzig, Johann Ambrosius Barth, Brüssel, Librairie Falk Fils. 1 Band von 128 Seiten mit Abbildungen. (Preis : 5.40 R.M.)

In English.

1932 625 .1 (06 (.73)

AMERICAN RAILWAY ENGINEERING ASSOCIATION.

Proceedings for 1932.

Chicago. Published by the Association, 59 East Van Buren street. (6 × 9 inches), 827 pages. (Price : $ 8.00.)

1932 62. (01 & 621 .89

AMERICAN SOCIETY FOR TESTING MATERIALS.

Report of Committee D-2 on **petroleum products and lubricants and methods of tests** relating to petroleum products, 1932.

Philadelphia. Offices of the Society. (Price : $ 1.25.)

1932 621 .3

HARDING (L. A.).

Steam power plant engineering.

London, W. C. 2., Chapman and Hall, Ltd., 11, Henrietta-street. (Price : 62 sh. 6 d. net.)

1932 625 .4 (.42

London Underground Extensions and Improvements.

Description of the extensions and improvements carried out by the Underground Electric Railways Company of London under the Developments (Loans Guarantees and Grants) Act, 1929.

Supplement to the **Railway Gazette,** 18 November 1932 (68 pages with numerous illustrations, line cuts).

1932 385. (09 (.42

MAC DERMOTT (E. T.).

History of the Great Western Railway. Vol. II, 1863-1921.

London. Great Western Railway Co.

1932 61

SLOCUM (S. E.), Ph. D.

Noise and vibration engineering.

London, E. C. 4, Crosby Lockwood and Son, 7, Stationers' Hall Court. (Price : 21 sh. net.)

1932 385. (08 (.9

STRACHAN (J.), General Manager and Chief Engineer, Federated Malay States Railways, M. I. C. E., M. I. St. E., M. I. T., M. B. I. P. S., M. F. C.

Federated Malay States Railways **Report for the year 1931.**

Kuala Lumpur. Federated Malay States Government Printing Office, 72 pages, illustrations and a map.

In Italian.

1932 69

SANTARELLA (Ing. L.).

Il cemento armato.

Milano, 1932, Hoepli. 1 volume (17 × 24 cm.), 52 pagine, 400 figure, 80 tavole. (Prix : 100 L.)

1932 624 .6

SANTARELLA (L.).

Ponti italiani in cemento armato.

Milano 1932, Hoepli. 1 volume 330 pagine, 247 figure, 69 tavole. (Prix : 90 L.)

[016 .385. (05]

II. — PERIODICALS.

In French.

Arts et Métiers. (Paris.)

1932 **669**
ts et Métiers, octobre, p. 353.
COQUELIN. — Du retard au **vieillissement des al-ges légers** à haute résistance. (2 000 mots & fig.

1932 **669 .1**
ts et Métiers, octobre, p. 366.
FAURE (L.). — Influence de certains facteurs sur caractéristiques **mécaniques** de l'**acier doux Tho-is.** (3 700 mots & fig.)

1932 **621 .43**
ts et Métiers, octobre, p. 374.
GUILLAUME (P.). — Etude sur l'emploi des **mo-urs à gaz de charbon de bois** pour l'équipement des tomotrices sur rails. (900 mots & fig.) .

1932 **669**
ts et Métiers, octobre, p. 387.
PUBELLIER. — La protection des **alliages légers** ntre la corrosion. (1 900 mots.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

1932 **621 .114**
lletin de la Société des ingénieurs civils de France, mars, avril, p. 614.
GROFF (J.). — Résolution graphique des problèmes atifs à la viscosité des **huiles de graissage** à dif-entes températures et à la viscosité de leurs mé-nges. (3 600 mots & fig.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

1932 **385 .113 (.493)**
lletin de l'Union internationale des chemins de fer, octobre, p. 298.
La Société Nationale des Chemins de fer belges en 31 et pendant les cinq premières années de son **ex-ploitation.** (5 800 mots.)

1932 **656 .1 (.42) & 656 .2 (.42)**
lletin de l'Union internationale des chemins de fer, octobre, p. 305.
Mesures prises ou envisagées en Grande-Bretagne ur la réglementation des **rapports du rail et de la ute.** (6 800 mots.)

1932 **656 .233 (.42)**
Bulletin de l'Union internationale des chemins de fer. octobre, p. 313.
Mise en commun de leur trafic par le London Midland & Scottish Railway et le London & North Eastern Railway. (4 000 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1932 **621 .43**
Bulletin technique de la Suisse romande, 12 novembre. p. 297.
Alimentation de moteurs Diesel par turbo-soufflantes. (3 100 mots & fig.)

1932 **656 .254**
Bulletin technique de la Suisse romande, 12 novembre, p. 300.
MULLER (A.-E.). — La question de **l'arrêt automatique des trains.** (2300 mots & fig.)

Chronique des transports. (Paris.)

1932 **656**
Chronique des Transports, 25 octobre, p. 10.
La **législation des transports routiers** à l'étranger. (2 400 mots.)

1932 **656 .1 (.42) & 656 .2 (.42)**
Chronique des Transports, 25 octobre, p. 7.
La coordination du rail et de la route en Grande-Bretagne. (2 300 mots.)

Génie civil. (Paris.)

1932 **62. (01**
Génie Civil, n° 2619, 22 octobre, p. 407.
DOUCET (E.). — **Etude élastique** des plaques rectangulaires encastrées sur trois côtés (charges fonctions continues de la hauteur). (1 500 mots & fig.)

1932 **625 .13 (.44)**
Génie Civil, n° 2619, 22 octobre, p. 412.
La reconstitution du **pont-rails de Moissac,** sur le Tarn. (1 700 mots & fig.)

1932 **656 .211 (.44)**
Génie Civil, n° 2620, 29 octobre, p. 438.
La **nouvelle gare de Versailles-Chantiers.** (900 mots & fig.)

1932 **62. (01 & 621 .39**
Génie Civil, n° 2621, 5 novembre, p. 459.
CARPENTIER (L.). — Les prescriptions allemandes de 1931 sur les **constructions soudées.** (1 600 mots & fig.)

1932 669 .1
Génie Civil, n° 2621, 5 novembre, p. 461.
Méthodes nouvelles de **purification de l'acier.** (1 800 mots.)

1932 621 .91
Génie Civil, n° 2623, 19 novembre, p. 493.
Surfaceuse-fraiseuse à quatre têtes, de 8 m. 55 de course. (1 800 mots & fig.)

L'Allègement dans les Transports. (Lucerne.)

1932 625 .2 (.494) & 625 .4 (.494)
L'Allègement dans les Transports, janvier-juin, p. 15.
HUG (Ad.-M.). — Les nouveaux **véhicules légers** du téléphérique Gerschnialp-Trübsee à Engelberg. (5 500 mots & fig.)

1932 625 .2 (0
L'Allègement dans les Transports, juillet-août, p. 46.
d'AUVIGNY (M.-H.). — L'emploi des **alliages légers dans la construction du matériel roulant.** (7 000 mots & fig.)

1932 625 .245
L'Allègement dans les Transports, septembre-octobre, p. 74.
GIESECKE (M.). — **Wagons d'empierrement** de la voie à déchargement automatique réglable, système Talbot. (2 100 mots & fig.)

La Traction électrique. (Paris.)

1932 625 .62 (.44)
La traction électrique, juillet, p. 82.
DEKEURVER (P.). — Les nouvelles **voitures motrices** à 3 essieux et à récupération des tramways électriques de Lille. (1 600 mots & fig.)

Les Chemins de fer et les Tramways. (Paris.)

1932 621 .33 (.44)
Les Chemins de fer et les Tramways, novembre, p. 181.
VIE (G.). — La **traction électrique** sur les Réseaux français en 1932. (4 500 mots.)

1932 621 .33 (.42)
Les Chemins de fer et les Tramways, novembre, p. 184.
SPIESS (E.). — **Electrification** de la ligne Londres-Brighton. (3 600 mots & fig.)

1932 697
Les Chemins de fer et les Tramways, novembre, p. 188.
CROZET (A.). — **L'Amélioration de l'atmosphère** dans les bureaux et ateliers de chemins de fer. (10 800 mots & fig.)

1932 625 .144.4
Les Chemins de fer et les Tramways, novembre, p. 195.
Appareil à mortaiser les rails. (2 800 mots.)

1932 621 .133.3
Les Chemins de fer et les Tramways, novembre, p. 198
Perfectionnements à la construction des **cylindres de locomotive.** (1 800 mots & fig.)

1932 621 .133.1
Les Chemins de fer et les Tramways, novembre, p. 200.
Procédé pour la **chauffe de foyers** au charbon pulvérisé avec amenée d'air additionnel. (2 300 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1932 385 .113 (.493)
L'Industrie des voies ferrées et des transports automobiles, octobre, p. 288.
BORDAS (F.). — Société Nationale des Chemins de fer belges. **Résultats** de cinq années d'exploitation. (3 900 mots & tableau.)

Rail et route. (Paris.)

1932 656
Rail et route, novembre, p. 77.
LAPIERRE (H.). — Le futur **régime des transports.** (3 700 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1932 656 .254 (.44
Revue générale des chemins de fer, novembre, p. 374
MAINCENT (M.) et AUGEREAU (M.). — **L'exploitation des lignes de banlieue** du réseau de l'Etat à l'aide de rames réversibles. (2 700 mots & fig.)

1932 656 .253 (.44
Revue générale des chemins de fer, novembre, p. 380
VINOT (M.). — Le **cantonnement automatique** sur les chemins de fer de l'Est. (6 000 mots & fig.)

1932 385 .1 (.498)
Revue générale des chemins de fer, novembre, p. 393
Rapport sur la **situation** des chemins de fer roumains en 1931. (6 800 mots.)

In German.

Die Lokomotive. (Berlin.)

1932 621 .132.3 (.438)
Die Lokomotive, Heft 11, November, S. 197.
BRILING (Dipl. Ing. G.). — **2-4-1 Schnellzuglokomotive** der Polnischen Staatsbahnen. (2 400 Wörter & Abb.)

1932 621 .132.8 (.56
Die Lokomotive, Heft 11, November, S. 203.
Neue **Dampf-Triebwagen** der türkischen Staatseisenbahnen. (900 Wörter & Abb.)

Elektrische Bahnen. (Berlin.)

1932 **621 .335 (.494)**
Elektrische Bahnen, Oktober, S. 225.
LATERNSER (Dipl.-Ing. A.). — Über einen neuen **Einphaser-Motorwagen** der Maschinenfabrik Oerlikon (M. F. O.) für die schweizerischen Bundesbahnen (S. B. B.) (1 900 Wörter & Abb.)

1932 **625 .234 (.494)**
Elektrische Bahnen, Oktober, S. 241.
STEINER (Dipl.-Ing. A.). — Das bei der Schweizerischen Bundesbahnen (S. B. B.) in Vorbereitung befindliche neue System der **elektrischen Zugheizung** für Durchgangswagen. (700 Wörter & Abb.)

Glasers Annalen. (Berlin.)

1932 **621 .94**
Glasers Annalen, Nr. 1329, 1. November, S. 71.
van STEEVEN (Ing. O. P.). — Ein neuer **Drehautomat** mit höchster Herspannungsleistung. (1 500 Wörter & Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1932 **625 .113**
Organ für die Fortschritte des Eisenbahnwesens, Heft 22, 15. November, S. 409.
PETERSEN (Prof. Dr. Ing. E. H. R.). — Der **Übergangsbogen** im Eisenbahngleis. Zusammenfassender Bericht über die Lösung dieser lang umstrittenen Aufgabe. (7 000 Wörter & Abb.)

1932 **625 .113**
Organ für die Fortschritte des Eisenbahnwesens, Heft 22, 15. November, S. 422.
SCHRAMM (Dr. Ing. G.). — Das **Winkelbildverfahren** in der Praxis. (2 600 Wörter & Abb.)

1932 **625 .113**
Organ für die Fortschritte des Eisenbahnwesens, Heft 22, 15. November, S. 428.
FEYL (Dr. E.). — Grundlage der **Bogenberichtigung.** (3 800 Wörter.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1932 **624 .2 (01**
Zeitschrift des Vereines deutscher Ingenieure, Nr. 44, 29. Oktober, S. 1065.
LEHR (Dr.-Ing. E.). — Querschnitt und Umriss. **Schwingungsmesstechnik.** (9 300 Wörter & Abb.)

1932 **669 .1**
Zeitschrift des Vereines deutscher Ingenieure, Nr. 44, 29. Oktober, S. 1077.
KOPPENBERG (H.). — Die Entwicklung des **Baustahls** St. 52. (7 200 Wörter & Tafeln.)

1932 **621 .115**
Zeitschrift des Vereines deutscher Ingenieure, Nr. 48, 26. November, S. 1161.
JAKOB (M.). — **Kondensation und Verdampfung.** Neuere Anschauungen und Versuche. (9 600 Wörter & Abb.)

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen. (Berlin.)

1932 **656 .257 (.43)**
Zeitschrift für das gesamte Eisenbahn-Sicherungswesen, Nr. 15, 20. November, S. 173.
DRESSEL. — Umgestaltung der Stellwerksanlagen auf Bahnhof Wiesbaden Hauptbahnhof. (2 100 Wörter & Abb.) (Schluss folgt.)

Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltugen. (Berlin.)

1932 **625 .215 & 625 .22**
Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen, Nr. 43 und 44, 27. Oktober und 3. November, S. 901 und 920.
HEUMANN (Prof. Dr.-Ing.). — Die **Entgleisungsgefahr** im Gleisbogen. (9.000 Wörter & Abb.)

1932 **313 .385 (.43)**
Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen, Nr. 45, 10. November, S. 937.
REMY (Dr.-Ing.). — Aufgaben, Aufbau und Ziele der **Reichsbahnstatistik.** (8 400 Wörter.)

1932 **656 .212.5**
Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen, Nr. 46, 17. November, S. 961.
MASCHKE. — Steigerung der **Abdrückgeschwindigkeit** durch Anwendung wechselnder Stufen. (2 000 Wörter & Abb.)

1932 **656 .1 & 656 .2**
Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen, Nr. 47, 24. November, S. 977.
v. SCHROEDER (Dr. jur. et phil). — Der **Schienen-Strassen-Verkehr.** (2 400 Wörter.)

1932 **656 .212.5 & 625 .258**
Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen, Nr. 47, 24. November, S. 985.
Hilfsmittel der **Rangiertechnik.** Der Rücklaufkeil. (1 500 Wörter & Abb.)

In English.

Bulletin, Americain Railway Engineering Association. (Chicago, Ill.)

1932 **385. (061.4 (.73) & 621.3 (.73)**
Bull., Amer. Ry. Eng. Ass[on], August, p. 1.
Reports of the electrical section. Meeting held at the Congress Hotel, Chicago, October 27th.

Engineer. (London.)

1932 **62. (01 & 624. (0**

Engineer, No. 4006, October 21, p. 400.

BALL (J. D. W.). — **Duration of reinforced concrete railway underbridges.** (1 300 words, 1 table & fig.)

1932 **621 .94**

Engineer, No. 4006, October 21, p. 402.

Precision **grinding machines.** (2 000 words & fig.)

1932 **691 & 721 .3**

Engineer, No. 4007, October 28, p. 422.

TAYLOR (W. T.). — **Reinforced concrete pole design.** (5 000 words, tables & fig.)

1932 **625 .151**

Engineer, No. 4008, November 4, p. 465.

An improved **railway point.** (150 words & fig.)

1932 **621 .132.8 (.61)**

Engineer, No. 4009, November 11, p. 480.

Articulated express locomotive for Algeria. (800 words fig & fig.)

1932 **624 .2**

Engineer, No. 4009, November 11, p. 492; No. 4010, November 18, p. 508.

INGLIS (C. E.). — **Dynamic effects in railway bridges.** (4 800 words & fig.)

1932 **621 .132.8**

Engineer, No. 4010, November 18, p. 504.

POULTNEY (E. C.). — **Mallet type locomotives.** (2 400 words & fig.)

1932 **385 (.51)**

Engineer, No. 4010, November 18, p. 510.

Railway development for China. (1 400 words & 1 table.)

1932 **624 .9**

Engineer, No. 4010, November 18, p. 518.

A **self-supporting welded steel roof.** (600 words & fig.)

1932 **621 .132.8**

Engineer, No. 4011, November 25, p. 528.

POULTNEY (E. C.). — **Mallet type locomotives.** (4 000 words & fig.)

1932 **656**

Engineer, No. 4011, November 25, p. 539.

Transport and economy. (2 200 words.)

1932 **385**

Engineer, No. 4011, November 25, p. 539.

The **Man-in-the-street and the Railways.** (2 200 words.)

1932 **621 .335 & 621 .43**

Engineer, No. 4011, November 25, p. 543.

Oil-electric locomotives. (1 200 words & fig.)

1932 **62. (01 & 669**

The Metallurgist, supplement to the Engineer, November 25, p. 167.

Recent American researches on « **fatigue of metals** ». (1 800 words & tables.)

1932 **669**

The Metallurgist, supplement to the Engineer, November 25, p. 170.

THEWS (E. R.). — **Melting and pouring white bearing metals.** (3 400 words & 2 tables.)

Engineering. (London.)

1932 **656**

Engineering, No. 3484, October 21, p. 479.

Transport and the nation. (1 900 words.)

1932 **621 .335 (.54) & 621 .43 (.54)**

Engineering, No. 3484, October 21, p. 488.

Narrow-gauge **oil electric rail car.** (1 000 words & fig.)

1932 **621 .335 (.593) & 621 .43 (.593)**

Engineering, No. 3485, October 28, p. 502.

Diesel-electric locomotive for Siam State Rys. (2 000 words & fig.)

1932 **614 .5**

Engineering, No. 3485, October 28, p. 515.

Malaria, as it affects railway maintenance and construction. (600 words.)

1932 **621 .392**

Engineering, No. 3485, October 28, p. 519.

An **automatic carbon-arc welder.** (450 words & fig.)

1932 **621 .132.8 & 625 .616**

Engineering, No. 3487, November 11, p. 569.

Secondary rail traction. (2 000 words.)

1932 **621 .392 & 624 .8**

Engineering, No. 3488, November 18, p. 583.

Electric welding at the Selby **swing bridge.** (2 000 words & fig.)

Engineering News-Record. (New York.)

1932 **624 .1 (.489)**

Engineering News-Record, No. 15, October 13, p. 427.

KAI KAAT-JENSEN. — **Bold open-caisson method** in Denmark. (1 500 words & fig.)

1932 **621 .392 & 624**

Engineering News-Record, No. 15, October 13, p. 446.

Metal structure and stress in welded joints. (2 500 words.)

1932 **625 .13**

Engineering News-Record, No. 17, October 27, p. 497.

KURODA (T.). — **Replacing plate-girder bridges by inverting the spans.** (700 words & fig.)

:932 625 .111
;ineering News-Record, No. 17, October 27, p. 501.
rand Trunk relocation on Detroit-Pontiac line.
00 words & fig.)

932 725 .31 (.73)
;ineering News-Record, No. 18, November 3, p. 527.
[OORE (L. E.). — **New station** added to Boston
vated. (2 300 words & fig.)

Indian Railway Gazette. (Calcutta.)

932 621 .92
ian Railway Gazette, September, p. 204.
'he Krupp patent **burnishing machine.** Prevention
hot axle journals. (2 200 words & fig.)

932 621 .335 (.47)
ian Railway Gazette, September, p. 208.
'he **Diesel-electric locomotive** in Russia. **Cooling**
nents for the engine. (1 500 words & fig.)

932 385 .113 (.43)
ian Railway Gazette, September, p. 209.
'he **German State Railway Company** in 1931. **Finan-**
condition of the Company. (2 000 words.)

932 621 .43 (.436)
ian Railway Gazette, October, p. 227.
TRAUSS (F.). — Trials with **pneumatic tyred rail-**
s. The Austro-Daimler rail-car. (1 400 words & fig.)

ournal, Institution of Engineers, Australia. (Sydney.)

932 621 .18 (.945)
rnal, Inst. of Eng., Australia. September, p. 297.
AUNDERS (E.). — **Structural problems.** New boi-
house, Yallourn. (6 300 words & fig.)

Journal, Institute of Transport. (London.)

932 656 .213
rnal, Institute of Transport, November, p. 7.
WEN (Sir David J.). — The problem of **port costs.**
00 words.)

932 621 .33 (.436) & 656 (.436)
rnal. Institute of Transport, November, p. 15.
TRAUSS (F.). — Transportation in Austria. With
ial reference to **railway electrification.** (11 000
ds & fig.)

ırnal, Permanent Way Institution. (Woking.)

932 625 .142.3
rnal, Perm. Way Institut., August, p. 189.
ARVEY (A. H.). — The « **unit** » **steel sleeper** and
manufacture. (3200 words & fig.)

1932 625 .143.1
Journal, Perm. Way Institut., August, p. 198.
BINDLEY (H. D.). — **Weight of rails.** (5 000 words & tables.)

1932 656 .254
Journal, Perm. Way Institut., August, p. 215.
TATTERSALL (A. E.). — Railway **signalling and traffic control** systems. (5 600 words.)

1932 656 .253 (.42)
Journal, Perm., Way Institut., August, p. 232.
BRYSON (W. H. H.). — **Resignalling** of St. Enoch station, Glasgow. (3 200 words & fig.)

1932 625 .244.4 (.42)
Journal, Perm. Way Institut., August, p. 245.
LANGLEY (A. E.). — **Rail laying** with small ramps. (1 400 words & fig.)

The Locomotive. (London.)

1932 621 .132.5 (.61)
The Locomotive, October 15, p. 343.
2-8-2 **locomotive** for Morocco. (250 words & fig.)

1932 621 .392
The Locomotive, October 15, p. 349.
Electric welding in locomotive boiler repairs. (250 words & fig.)

1932 621 .13 (.52)
The Locomotive, October 15, p. 350.
Recent **locomotives,** Imperial Japanese Railways. (1 400 words & fig.)

1932 621 .335 (.54) & 621 .43 (.54)
The Locomotive, October 15, p. 360.
Diesel-electric rail-cars : H. H. the Gaekwar's Baroda State Rys. (2 300 words & fig.)

1932 62. (01
The Locomotive, October 15, p. 398.
The use of **X-rays for testing locomotive details** : German State Rys. (700 words & fig.)

1932 621 .133.2
The Locomotive, October 15, p. 400.
Steel fireboxes for locomotives. (2 600 words & fig.)

Mechanical Engineering. (New York.)

1932 621 .31
Mechanical Engineering, November, p. 771.
CHRISTIE (A. G.). — **Surplus power from industrial plants.** (4 000 words & fig.)

1932 313 : 65
Mechanical Engineering, November, p. 778.
Applications of **statistical method in engineering and manufacturing.** (2 800 words.)

Modern Transport. (London.)

1932 385 .1 (.436)

Modern Transport, No. 710, October 22, p. 3.

STRAUSS (F.). — **Railway problems in Austria.** (2 400 words.)

1932 **621 .43 (.42)**

Modern Transport, No. 710, October 22, p. 5.

New British **two-stroke C. I.** engine. (1 800 words & fig.)

1932 **621 .43 (.42) & 656 .1 (.42)**

Modern Transport, No. 710, October 22, p. 7.

New **road-rail vehicle.** The Dunlop « railroute ». (1 100 words & fig.)

1932 **385 .4 (.42) & 385 .113 (.42)**

Modern Transport, No. 711, October 29, p. 3.

Railways and standard revenue. (1 800 words & 2 tables.

1932 **621 .43 (.82)**

Modern Transport, No. 711, October 29, p. 5.

RYAN (M. F.). — **Railcar developments in Argentina.** Petrol-engined units for Branch line services. (3 000 words & fig.)

1932 **625 .25 (.4) & 656 .222.6 (.4)**

Modern Transport, No. 712, November 5, p. 3.

STRAUSS (F.). — **Brakes for goods trains.** (1 600 words & fig.)

1932 **621 .132.8 (.42)**

Modern Transport, No. 712, November 5, p. 5.

Steam railcars for the L. N. E. R. (800 words & fig.)

1932 **656 .1 (.42)**

Modern Transport, No. 713, November 12, p. 3.

WALTON (L.). — Salter **report on rail and road transport and the motor industry.** (2 300 words & fig.)

1932 **656 .257 (.42)**

Modern Transport, No. 713, November 12, p. 8.

Railway invoicing and accounting. (1 700 words & fig.)

1932 **656 .235. (0**

Modern Transport, No. 713, November 12, p. 12.

Industrial traffic management. — The railway classification. (1 400 words.)

1932 **347 .763 (.42) & 656 .1 (.42)**

Modern Transport, No. 714, November 19, p. 3.

HERBERT (E. S.). — **Licensing under the Road Traffic Act.** (4 500 words.)

1932 **656 .27**

Modern Transport, No. 714, November 19, p. 5.

HARE (T. B.). — Problem of **branch lines. Lower standards** and **special staff.** (3 900 words.)

1932 **347 .764 (.42) & 656 .1 (.42)**

Modern Transport, No. 714, November 19, p. 9.

First report of Traffic Commissioners. (2 000 words & tables.)

Proceedings, American Society of Civil Engineer (New York.)

1932 **624 .51 (.7**

Proceed., Amer. Soc. Civil Eng., September, p. 13

STEARNS (E. W.). — **George Washington bridge** organization, construction procedure, and contract pr visions. (13 500 words, tables & fig.)

1932 **624 .3 & 624 .(**

Proceed., Amer. Soc. Civil Eng., September, p. 13

EREMIN (A. A.) & REICHMANN (A. F.). — Co struction plant and methods for **erecting steel bridge** (350 words.)

1932 **6**

Proc., Amer. Soc. of Civil Engineers, November, p. 14

FLETCHER (R.). — A history of the developme of **wooden bridges.** (13 000 words & fig.)

1932 **62. (01 & 621 .**

Proc., Amer. Soc. of Civil Engineers, November, p. 149

TROELSCH (H. W.). — **Distribution of shear** **welded connections.** (2 500 words & fig.)

1932 **621 .**

Proc., Amer. Soc. of Civil Engineers, November, p. 150

HRENNIKOFF (A.). — Work of rivets in **rivet joints.** (4 000 words & fig.)

Proceedings, Institution of Mechanical Engineer (London.)

1932 **62. (01 & 669**

Proceed., Institution of Mechanical Engineers, vol. 12 p. 383.

ROBINSON (F.E.) & NESBITT (C. T.). — T **machinability of steel** as indicated by its macrostru ture. (15 000 words & fig.)

1932 **621 .**

Proceed., Institution of Mechanical Engineers, vol. 12 p. 423.

BOSWALL (R. O.). — The **film lubrication of t** journal bearing. (45 000 words, tables & fig.)

1932 **627 (.42) & 656 .213 (.4**

Proceed., Institution of Mechanical Engineers, vol. 12 p. 575.

BINNS (A.). — Recent development in the **mecha ical equipment of the Port of London** Authorit (17 000 words & fig.)

1932 **621 .**

Proceed., Institution of Mechanical Engineers, vol. 12 p. 685.

DAVIES (S. J.). — **High-speed heavy-oil engines** their characteristics and the trend of their develo ment. (7 000 words & fig.)

Railway Age. (New York.)

1932 621 .335 (.73)
ilway Age, No. 16, October 15, p. 530.
:RATON (F. H.) & WALKER (J. F.). — **Perfor-nce of New York Central electric freight locomo-es.** (1 800 words & fig.)

1932 625 .235
ilway Age, No. 16, October 15, p. 533.
MARSHALL (J.). — **Freight damage** involves many department problems. (2 000 words & fig.)

1932 621 .13 (0
ilway Age, No. 16, October 15, p. 537.
Lehigh Valley **locomotives return 38 per cent on vestment.** (1 200 words & fig.)

1932 625 .234 (.73)
ilway Age, No. 16, October 15, p. 541.
Precooler for passenger cars. (1 000 words & fig.)

1932 656 .255 (.73)
ilway Age, No. 17, October 22, p. 562.
Chicago, Rock Island & Pacific extends **centralized ntrol.** (1800 words & fig.)

1932 656 .213 (.73)
ilway Age, No. 17, October 22, p. 565.
Produce terminals expedite the **handling of perish-les.** (2 900 words & fig.)

1932 625 .245 (.73)
ilway Age, No. 17, October 22, p. 573.
Kansas City Southern gets **all-steel hopper gondolas.** 400 words & fig.)

1932 621 .335
ilway Age, No. 17, October 22, p. 575.
BRACKETT (R. D.). — **Electric rolling stock for** ain. (1 900 words & fig.)

1932 621 .132.8
ailway Age, No. 18, October 29, p. 598.
Turbine locomotive operates non-condensing. (1 500 ords & fig.)

1932 656 .1 (.73)
ailway Age, No. 18, October 29, p. 601.
New York Club discusses **competition.** (4 000 words.)

1932 625 .4 (.73) & 656 .211 (.73)
ailway Age, No. 18, October 29, p. 605.
A suburban **passenger terminal** in a congested loca-on. (3 400 words & fig.)

1932 656 .2 (.73)
ailway Age, No. 18, October 29, p. 615.
WHEELER (H. A.). — **Public must** solve railroad **oblem.** (3 200 words.)

1932 625 .13 (.73)
ailway Age, No. 19, November 5, p. 632.
Extensive **tunnel work** on the Chesapeake & Ohio ears completion. (4 000 words & fig.)

1932 656 .253 (.73) & 656 .256.3 (.73)
Railway Age, No. 19, November 5, p. 637.
Dwarf signals for automatic blocks on Pere Marquette. (800 words & fig.)

1932 385 .587 (.73) & 621 .138.1 (.73)
Railway Age, No. 19, November 5, p. 643.
RICHARDSON (L.). — **Graphs simplify control of mechanical operations.** (2 100 words & fig.)

1932 621 .3 (06 (.73) & 625 .1 (06 (.73)
Railway Age, No. 19, November 5, p. 647.
Electrical section and **A. R. E. E.** hold **joint meeting.** (4 700 words.)

1932 625 .13 (.73)
Railway Age, No. 20, November 12, p. 665.
Effective methods are employed in **enlarging tunnels** on Chesapeake & Ohio. (2 900 words & fig.)

1932 621 .43 (.73)
Railway Age, No. 20, November 12, p. 669.
Budd-Micheline car delivered to the Reading. (1 400 words & fig.

1932 385 .1 (.73)
Railway Age, No. 20, November 12, p. 675.
WHITBRIDGE (H. L.). — The **future of the railways.** (5 800 words.)

Railway Engineer. (London.)

1932 625 .172
Railway Engineer, November, p. 381.
Rail joints and creep. (900 words.)

1932 656 .254 (.436)
Railway Engineer, November, p. 383.
The Kofler **automatic train-stop.** (1 000 words & fig.)

1932 625 .1 (.42)
Railway Engineer, November, p. 387.
Barking-Upminster widening and **electrification,** London Midland & Scottish Ry. (2 200 words & fig.)

1932 621 .132.5 (.82)
Railway Engineer, November, p. 393.
New **cross-compound mixed-traffic locomotives.** Buenos Ayres Western Ry. (1 700 words & fig.)

1932 621 .43
Railway Engineer, November, p. 396.
Mobile trucks for railway use. X. — The Lodemor **petrol trucks.** (1 600 words & fig.)

1932 625 .244
Railway Engineer, November, p. 399.
DARLING (C. S.). — **Solid carbon dioxide in railway transport.** (1 100 words.)

1932 621 .135. (01
Railway Engineer, November, p. 399.
BALL (J. D. W.). — **Equivalent distributed loads for recent locomotives.** (1 200 words, tables & fig.)

1932 **625 .143.4**
Railway Engineer, November, p. 402.
An ingenious **reinforced rail joint.** (900 words & fig.)

1932 **621 .138.3 (.42)**
Railway Engineer, November, p. 404.
Improved **wheel drops** on the L. M. S. R. (1 000 words & fig.)

1932 **621 .138.3 (.42)**
Railway Engineer, November, p. 407.
EVERITT (F.). — Special **foundations for the wheel drop** at Stafford locomotive shed. (400 words & fig.)

Railway Engineering and Maintenance. (New York.)

1932 **625 .17 (.73)**
Railway Engineering & Maintenance, October, p. 621.
Bringing the section forces up to date. (1 700 words & fig.)

1932 **725 .44**
Railway Engineering & Maintenance, October, p. 623.
Small **preframing plant** effects large savings. (2 500 words & fig.)

1932 **625 .123 (.73)**
Railway Engineering & Maintenance, November, p. 662.
Burrow under fill to **stop slides.** (2 400 words & fig.)

1932 **698**
Railway Engineering & Maintenance, November, p. 666.
Spray guns save in **painting large train shed.** (2 600 words & fig.)

1932 **625 .17**
Railway Engineering & Maintenance, November, p. 671.
GEYER (C. J.). — Present day conditions. — A challenge to the Roadmaster. (3 100 words.)

1932 **624 .8**
Railway Engineering & Maintenance, November, p. 674.
Floating swing spans for railroad **bridges.** (3 000 words & fig.)

Railway Gazette. (London.)

1932 **385. (09 .1 (.436) & 621 .33 (.436)**
Railway Gazette, No. 17, October 21, p. 483.
STRAUSS (F.). — The **railways of Austria.** (2 200 words & fig.)

1932 **625 .162 (.82) & 656 .254 (.82)**
Railway Gazette, No. 17, October 21, p. 485.
Level crossing protection in Argentina. (1 000 words & fig.

1932 **656 .1 (.54)**
Railway Gazette, No. 17, October 21, p. 489.
Co-ordinated transport in Hyderabad. (1 300 words & fig.)

1932 **621 .33 (.438)**
Railway Gazette, No. 18, October 28, p. 511.
Railway electrification in Poland. (1 100 words & fig.)

1932 **621 .132.8 (.44)**
Railway Gazette, No. 18, October 28, p. 514.
Beyer-Garratt **express locomotive tests** in France (1 000 words & fig.)

1932 **621 .43 (.436)**
Railway Gazette, No. 18, October 28, p. 517.
Pneumatic-tyred railcars in Austria. (1 000 words & fig.)

1932 **656 .233 (.42)**
Railway Gazette, No. 19, November 4, p. 539.
Pooling schemes' inquiry. (2 600 words.)

1932 **625 .23**
Railway Gazette, No. 19, November 4, p. 540.
A new suggestion for **railway carriage seating.** (1 000 words & fig.)

1932 **621 .335 & 621 .43**
Railway Gazette, No. 19, November 4, p. 544.
Diesel-electric shunter range **standardised.** (800 words & fig.)

1932 **621 .43**
Railway Gazette, No. 19, November 4, p. 547.
Two **Diesel shunting locomotives.** (1 000 words & fig.)

1932 **725 .36 (.82)**
Railway Gazette, No. 19, November 4, p. 549.
New terminal **grain elevator** in Argentina. (2 300 words & fig.)

1932 **656 .254 (.43)**
Railway Gazette, No. 20, November 11, p. 571.
Telephone train dispatching in Germany. (1 600 words & fig.)

1932 **385 .4**
Railway Gazette, No. 20, November 11, p. 573.
Railway reconstruction. (1000 words.)

1932 **621 .138**
Railway Gazette, No. 20, November 11, p. 578.
A device for **moving locomotives not in steam.** (350 words & fig.)

1932 **656 .222.6 (.42)**
Railway Gazette, No. 20, November 11, p. 579.
Coal train working on the L. M. S. R. (1 000 words & fig.)

1932 **347 .763**
Railway Gazette, No. 21, November 18, p. 600.
Government control of road transport abroad. (2 200 words.)

1932 **621 .132.8 (.77)**
Railway Gazette, No. 21, November 18, p. 605.
Remarkable new **Beyer-Garratt** for U. S. S. R. (5 000 words & fig.)

Railway Magazine. (London.)

1932 **385. (091 (.489)**
e Railway Magazine, November, p. 313.
.ASSON (T.). & BLOCH (B.). — **The railways of nmark.** (4 000 words & fig.)

1932 **656 .222.6 (.42)**
e Railway Magazine, November, p. 338.
Some **modern freight « Flyers ».** (2 800 words & .)

Railway Mechanical Engineer. (New York.)

1932 **625 .245 (.73)**
ilway Mechanical Engineer, p. 439.
Hopper gondolas for the Kansas City Southern. (2 400 rds, tables & fig.)

1932 **621 .134.3 (.71)**
ilway Mechanical Engineer, p.444.
Multi-pressure locomotive on the Canadian Pacific. 400 words & fig.)

1932 **621 .135.2 (.73)**
ilway Mechanical Engineer, p. 451.
BRUNNER (H. E.) & TAYLOR (B. W.). — **Roller arings on driving journals** show economies. (3 000 rds & fig.)

Railway Signaling. (Chicago.)

1932 **656 .254 (.73)**
ilway Signaling, October, p. 293.
CURRAN (J. W.). — **Remote control** with C. T. C. uipment on Boston & Albany. (2 400 words & fig.)

1932 **625 .4 (.73) & 656 .25 (.73)**
ilway Signaling, October, p. 296.
New Eigth Avenue **subway signaling and interlocking** New York City. (2 400 words & fig.)

1932 **656 .25 (0**
ilway Signaling, October, p. 305.
ZANE (W. F.). — **The prevention of frost trouble.** 000 words & fig.)

1932 **656 .255 (.73)**
ilway Signaling, November, p. 325.
C. R. I. & P. extends **centralized control.** (2 300 words fig.)

1932 **625 .162 (.73) & 656 .254 (.73)**
ilway Signaling, November, p. 329.
Alton Railroad demonstrates feasibility of **automatic terlocking** at complex grade crossings. (1 400 words fig.)

1932 **656 .254 (.73)**
ailway Signaling, November, p. 331.
ROBERTS (A. A.). — Brooklyn & Queens Transit orp. uses **automatic headway recorders** as part of gnaling system. (850 words & fig.)

1932 **625 .258 (.73) & 656 .254 (.73)**
Railway Signaling, November, p. 335.
Survey of **car-retarder systems.** (1 650 words & fig.)

1932 **625 .253**
Railway Signaling, November, p. 338.
SHEETS (R. A.). — Maintenance of **car retarders.** (1 400 words & fig.)

South African Railways and Harbours Magazine. (Johannesburg.)

1932 **656 .212 (.68)**
South Afric. Rys. and Harb. Magazine, October, p. 1212.
The **working of an important goods depot.** (3 600 words & fig.)

Transit Journal. (New York.)

1932 **621 .33 (.73) & 625 .62 (.73)**
Transit Journal, November, p. 503.
Trolley buses generally classified as street cars. (4 500 words.)

University of Illinois Bulletin. (Urbana, Ill., U. S. A.)

1932 **621 .31**
University of Illinois Bulletin, No. 48, February 12, p. 1.
MOORE (H. F.) & ALLEMAN (N. J.). — The **creep of lead and lead alloys** used for cable sheathing. (6 000 words & fig.)

1932 **625 .212**
University of Illinois Bulletin, No. 76, May 20, p. 1.
MOORE (H. F.), ROY (N. H.) & BETTY (B. B.). — A study of **stresses in car axles** under service conditions. (24 000 words, tables & fig.)

In Spanish.

Anales de la Asociacion de Ingenieros del I. C. A. I. (Madrid).

1932 **621 .33**
Anales de la Asociacion de Ingenieros de l'I. C. A. I., octubre-noviembre, p. 562, 625.
NOVARRETE Y DEL SOLAR (J. M.). — **Electrificaciones ferroviarias.** (4 700 parole & fig.)

Ferrocarriles y Tranvias. (Madrid.)

1932 **385. (09 (.725)**
Ferrocarriles y Tranvias, septiembre, p. 273.
HOLMES (J. D. W.). — **Efemérides** del Ferrocarril Mexicano. (900 palabras & fig.)

1932 **625 .245 (.460)**
Ferrocarriles y Tranvias, septiembre, p. 288.
Vagón de auxilio con grúa de veinte toneladas. (900 palabras & fig.)

Gaceta de los Caminos de hierro. (Madrid.)

1932 **385 .1 (.4)**

Gaceta de los Caminhos de hierro, 1 de noviembre, p. 229.

La **situación económica** de los ferrocarriles europeos. (2 000 palabras.)

Revista de Obras Publicas. (Madrid.)

1932 **656 .1 & 656 .2**

Revista de Obras Publicas, N° 21, 1 de noviembre, p. 492.

ARANGO (L. R.). — La **carretera y el ferrocarril.** (2 900 palabras.)

1932 **624 .6**

Revista de Obras Publicas, N° 21, 1 de noviembre, p. 497.

CASADO (C. F.). — Teoria del **arco.** (2 500 palabras & fig.)

1932 **625 .13 (.460)**

Revista de Obras Publicas, N° 22, 15 de noviembre, p. 509.

MEJON (C.). — Recalce y consolidación de la sexta pila del **puente** sobre el Ebro, en Zaragoza, de la linea del ferrocarril de Zaragoza a Alsasua. (1 500 palabras & fig.)

1932 **62. (01 & 691**

Revista de Obras Publicas, N° 22, 15 de noviembre, p. 518.

BLANC (A.). — Algo de teoria sobre el ensayo de los **aglomerados de cemento** y de los materiales integrantes de los mismos. (1 500 palabras.)

In Italian.

Annali dei lavori pubblici. (Roma.)

1932 **62. (01**

Annali dei lavori pubblici, p. 612.

ANTONINI (Dott. Ing. G.). — Le variazioni della **ellisse di elasticita** durante la deformazione di un solido elastico. (6 500 parole & fig.)

L'Ingegnere. (Roma.)

1932 **669**

L'Ingegnere, Ottobre, p. 702.

FAGGIANI (Dr. D.). — **Comportamento meccanico dei metalli** ad alta temperatura. (3 000 parole & tabella.)

1932 **624 .2**

L'Ingegnere, Ottobre, p. 718.

CAMOLETTO (Dr. Ing. C. F.). — Un nuovo apparecchio per la misura delle **inflessioni dinamiche sui ponti.** (2 000 parole & fig.)

1932 **624.5**

L'Ingegnere, Ottobre, p. 725.

RABBI (Dr. Ing. G.). — **Trave Vierendeel** a c renti paralleli ed aventi per ogni scomparto ugu momento d'inerzia. (1 500 mots & fig.)

Notiziario tecnico. (Firenze.)

1932 **669**

Notiziario tecnico, novembre, p. 285.

L'acciaio **di fucina.** Le temperature di fucimatu (2 500 parole & fig.)

Rivista tecnica delle ferrovie italiane. (Roma

1932 **385. (**

Rivista tecnica delle ferrovie italiane, 15 ottob p. 203.

ADDONE (Ing. C.). — Per il primo decennale fa cista. I più recenti progressi delle **comunicazioni f** roviarie. (4 900 parole.)

1932 **621 .33 (.4)**

Rivista tecnica delle ferrovie italiane, 15 ottob p. 214.

CARLUCCI (Dott. Ing. V.). — La **linea in cavo** 60 000 Volt per la sottostazione di Genova-Terral (3 200 parole & fig.)

1932 **55 (.4**

Rivista tecnica delle ferrovie italiane, 15 ottob p. 229.

CORRADI (C.). — Studi geognostici riguardar parecchi **casi di roccie instabili** lungo le linee ferroviar (4 000 parole & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1932 **625 .2 (0 & 6**

De Ingenieur, nr 44, 28 October, p. 102.

BOLLEMAN KYLSTRA (E.). — **Gelaschte stal spoorwegvoertuigen.** (3 000 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1932 **624 .3 (.49**

Spoor- en Tramwegen, nr 9, 25 October, p. 213.

De **brug** over de Lek by Kuilenburg. (1 200 woord & fig.)

1932 **656 .225 (.49**

Spoor- en Tramwegen, nr 9, 25 October, p. 218.

Invoering en gebruik van z. g. **lichte goederentrein** op verschillende baanvakken der Nederlandsche Spoo wegen. (1 200 woorden & fig.)

1932 624 .2

oor- en Tramwegen, nr 9, October, p. 220.

MARIOUW SMIT (Ir. H. P. W.). — **Veerslingeringen resonnantie.** (2 700 woorden & fig.)

1932 62. (01 (.43)

oor- en Tramwegen, nrs 10 en 11, 8 en 22 November, pp. 245 en 270.

LEONHARDT (Ing. R.). — Nieuwe **methoden en komsten van Röntgenonderzoek** bij de Duitsche ichsbahn. (3 600 woorden & fig.)

1932 621 .133.7 (.492)

oor- en Tramwegen, nr 11, 22 November, p. 263.

HAGEDOORN (Ir. C. F. J.). — De **onthardingsinrichting** van het ketelvoedingwater te Roosendaal. (1 200 woorden & fig.)

In Portuguese.

Instituto de Engenharia. (São Paulo.)

1932 313 .385 (01

Instituto de Engenharia, N° 84, Junho, p. 249.

COSTA (H.). — A **estatistica** como factor predominante de administração. (2 700 mots, tabl. & fig.)

13.794. — M. Weissenbruch Co., Ltd., Printer of the King, 49, rue du Poinçon, Bruxelles.

MONTHLY BIBLIOGRAPHY OF RAILWAYS (1).

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016 .385. (02]

I. — BOOKS.

In French.

932 385 .63
KERMANN (Ch.).

onvention internationale pour le transport des marndises par chemins de fer (C. I. M.) de 1924.

aris (Ve), Librairie du Recueil Sirey, 22, rue Souf-, 1 volume in-8°. (Prix : 15 francs français.)

---

933 347 .763
KERMANS (Ch.).

épertoire de jurisprudence en matière de transports.

aris (Ve), Librairie du Recueil Sirey, 22, rue Souf- 1 fort volume in-8°. (Prix : 125 francs français.)

---

932 385. (091 (.4)

arte des chemins de fer de l'Europe.

aris (VIIe), Pierre-Henry Barrère, 21, rue du Bac. x : en 6 feuilles, index et atlas, 140 francs français; e, vernie, montée sur gorge et rouleaux (215 × 255) index et atlas, 375 francs français.)

---

932 33. (02
SON (C.).

ours d'économie politique professé à l'Ecole Polynique et à l'Ecole Nationale des Ponts et Chaussées.

aris (VIe), Gauthier-Villars & Cie, 55, quai des nds-Augustins. 1 volume (16 × 25), 190 pages. x : 20 francs français.)

---

932 621 .33 (.3)

nnées sur l'électrification des chemins de fer à anger.

aris (VIIIe), Office pour le perfectionnement de la ion autonome sur les chemins de fer, 3, rue Por- 1 brochure, 15 pages.

---

32 621 .116 (02
OPIN (J.) & ASTRUC (H. M.).

s de chaudières à vapeur.

aris, Charles-Lavauzelle et Cie. 1 volume, 460 pages 1 figures. (Prix : 50 francs français.)

1932 621 .96
KACZMAREK (E.).

Procédés modernes de découpage et d'emboutissage.

Paris (VIe), Dunod, 92, rue Bonaparte. 1 volume (16 × 25), 256 pages et 186 figures. (Prix : 76 francs français.)

1932 624 .2
KLUTZ (Th.).

Nouvelle méthode de calcul des poutres droites continues, des portiques et des cadres simples.

Paris (Xe), Constructeur de Ciment Armé, 148, boulevard Magenta. 1 volume (16 × 24), 260 pages, 135 figures. (Prix : 40 francs français.)

1932 385

La situation des réseaux et les mesures qu'elle comporte. Le plan des compagnies.

Paris (Ier), Maulde et Renou, 144, rue de Rivoli. 1 brochure, 80 pages.

1932 621 .33 (.439)

L'électrification de la ligne de chemin de fer de Budapest à Hegyeshalom, selon le système Kandó à convertisseur de phase.

Budapest, Athenaeum. 1 volume, 56 pages, figures et schémas.

1932 313 .385 (.437)

Statistique des chemins de fer tchécoslovaques pour 1931.

Praha, Nakladem ministerstva Zeleznic. Tiskl Josef Pacl ve Strakonicich. 1 volume, 152 pages et 1 carte.

1932 341
VADNAI (E).

Handbuch des internationalen Frachtverkehrs.

Zurich, Société suisse des commerçants. 1 volume, 183 pages. (Prix : 6.50 francs suisses.)

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(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress ointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to way Science », by L. WEISSENBRUCH, in the number for November 1897, of the *Bulletin of the International Railway Congress*, 509).

In German.

1932 385 .113 (.436) & 656 .1 (.73)
Die Österreichischen Bundesbahnen in den Jahren 1931-1932. Wettbewerb zwischen Schienen- und Strassenverkehr in den Vereinigten Staaten von Amerika (Reisebericht).

Wien, Österreichischen Bundesbahnen, 1 Band, 16 Seiten.

1933 621 .138.5 (.43) 625 .19 (.43) & 625 .26 (.43)
ERHALTUNGSWIRTSCHAFT.

Die wirtschaftliche Erhaltung der Fahrzeuge, Maschinen, Geräte und Weichen in den Ausbesserungs- und Betriebswerken der Deutschen Reichsbahn-Gesellschaft.

Herausgegeben von P. Kühne unter Mitwirkung von .... XVI, 512 Seiten mit Abb., mehreren Tafeln und Tabellen, 4°. (Preis Leinwand : RM. 30.)

1932 691
GASSNER (O.).

Auskünfte über Baumetalle.

Leipzig, Johann Ambrosius Barth & Brüssel, Falk, Fils, 22, rue des Paroissiens. 1 Band, 26 Seiten und Abbildungen. (Preis : 2.75 RM.)

1932 669 .1
GRÜTZNER (A.).

Eisen- und Stahllegierungen. Patentsammlung.

Berlin, Verlag Chemie. 1 Band, 308 Seiten. (Preis : 32 RM.)

1932 69. (02
Handbibliothek für Bauingenieure.

Ein Hand- und Nachschlagebuch für Studium und Praxis. Herausgegeben von R. Otzen.

I. Teil : Hilfswissenschaften, 4. Band : M. Näbauer, Vermessungskunde.

Zweite umgearbeitete und verbesserte Auflage IX, 401 Seiten mit 439 Textabbildungen, gr. 8°. (Preis gebunden : 23.50 RM.)

1932 62 (03
HOYER-KREUTER.

Technologisches Wörterbuch.

Berlin, Julius Springer. Dritter Band, Französisch-Deutsch-Englisch. (Preis : 78 RM.)

1932 721 .9
KERSTEN (C.).

Der Stahlhochbau.

Berlin, Wilhelm Ernst & Sohn. 1 Band, 292 Seiten, 867 Abbildungen. (Preis : 19.50 RM.)

1932 691 .721.9
KLEINLOGEL (A.).

Winterarbeiten im Beton- und Eisenbetonbau.

Berlin, Wilhelm Ernst & Sohn. 1 Band, 122 Seiten, 87 Abbildungen. (Preis : 9.80 RM.)

1932 62. (02
UHLAND (W. H.).

Uhlands Ingenieur-Kalender 1933.

Leipzig, Alfred Kröner. 1 Band, 1 061 Seiten und Abbildungen. (Preis : 5.40 RM.)

In English.

1932 385. (09 (.73
American Railroads. Four phases of their history
Princeton (New Jersey), U. S. A. Princeton University Press. 120 pages. (Price : $ 1.50.)

1932 721 .9
CROSS (H.) & DOLBEY MORGAN (N.).

Continuous frames of reinforced concrete.

New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Ltd. (6 × 9 inches), 343 pages. (Price $ 4.50.)

1933 665 .882 (0
Encyclopaedia of oxy-acetylene welding.

Vol. 1 : Pipe construction. Vol. 2 : Construction of apparatus and containers.

London. Acetylene and Welding Consulting Bureau Ltd. (9 × 12 inches). Vol. 1, 83 pages. Vol. 2, 80 pages illustr., diagrams & tables. (Price : 10 sh. 6 d.)

1932 656 .2
FRASER (J. H.), B. Sc.

Lewis's Railway signal engineering (Mechanical).

London, W. C. 2. Constable and Co. Ltd., 10, Orange street. (Price : 16 sh. net.)

1932 621 .1 (0
GOUDIE (W. J.), D. Sc.

Ripper's steam engine theory and practice.

London. Longmans, Green and Co. Eighth edition (Price : 25 sh.)

1932 621 .18 (0
HARDING (L. A.), B. S., M. E.

Steam power plant engineering.

New York. John Wiley & Sons, Inc. London, Chapman and Hall. (Price : 62 sh. 6 d.)

1932 621 .4
HELDT (P. M.).

High-speed Diesel engines.

London. Iliffe and Sons, Ltd. (Price : 22 sh. 6 d. net)

1932 016 .351.712 (06 (.42
Indexed list of British standard specifications. Annual report, July 1932.

London, S. W. I. British Standards Institution, Publication Department, 28, Victoria street, S. W. 1. 84 p. (Price : 1 sh. 2 d.)

1932 62. (01 (0
International Association for Testing Materials Zurich Congress, September 6-12, 1931. Vols. I and II.

Zurich, Offices of the Association, 27, Leonhardstrasse. (Price : 60 Swiss francs to members; 80 Swiss francs to non-members.)

1932 62. (
KIMBALL (A. L.).

Vibration prevention in engineering.

New York, John Wiley & Sons; London, Chapman & Hall, Ltd. (6 × 9 inches), 145 pages. (Price : $ 2.50

1932 **65 (.42)**

Modern developments on London Midland and Scottish ailway. **Rationalisation. Scientific research. Costing.** Reprinted from Modern Transport, May 28, June 4 ıd 11. 1932.)

London, W. C. 2. Modern Transport Publishing Co., d. Norman House, 105/109, Strand. 30 pages & tables.

1933 **385. (061 (.62) & 385. (091 (.62)**

ODERN TRANSPORT.

Special section in connection with the Twelfth Session of the International Railway Congress Association, airo 1933 (Supplement to the 7th January, No. 721, sue.) Contents : **Description of Egyptian Railways, bstracts of reports submitted,** etc.

London, Modern Transport. 1 vol., 32 pages illustrated.

1932 **385 .4**

Organizations in the field of **public administrations.**

Chicago, Ill. Published by Public Administration earing House, 850 East 58th Street. (Price : $ 1.00.)

1932 **38 (.71)**

Report of the Royal **Commission to inquire into Railays and Transportation in Canada.**

Ottawa. F. A. Acland, printer to H. M. the King. 5 pages. (Price : 75 cents.)

1932 **385 .15 (.81)**

IITH DUNCAN (Julian).

Public and private operation of railways in Brazil.

New York. Columbia University Press. (6 × 9 inches), 3 pages, maps and table. (Price : $ 3.75.)

1932 **385 .1 (.73)**

IE RAILWAY AGE.

A vital message to the American People and their overnments. (An exposition of the **railway situation** — its causes and the remedies which must be applied). A series of 22 articles contained in the 3 December issue of **Railway Age.** (96 pages, illustrated.)

1932 **385. (061 (.62) & 385. (091 (.62)**

THE RAILWAY GAZETTE.

Special Number in connection with the Twelfth Session of the International Railway Congress Association, Cairo, 1933.

Principal contents : Programme of Congress. The Egyptian State **Railways.** King Fuad I. Egyptian **Railway Scenes.** Other Egyptian Railways. — Abstracts of **Congress reports.**

London, The Railway Gazette. 1 vol. (12 × 9 inches), of 66 pages, illustrated.

1932 **621 .33**

THE RAILWAY GAZETTE.

Southern Railway London-Brighton-Worthing Electrification Extension.

Supplement to the Railway Gazette for 30 December 1932. Contents : Traffic Operation. Constructional and trackwork. Power supply and distribution. Automatic and power signalling. New rolling stock. New Pullman cars.

London, The Railway Gazette. 1 vol. (12 × 9 inches) of 64 pages, illustrated.

In Spanish.

1932 **656 .1 & 656 .2**

BLAS VIVES.

El problema de la coordinación de los transportes ferroviarios y de los mecánicos por carretera.

Madrid, Imprenta Gráfica Administrativa. 1 folleto (17 × 24 cm.), 81 páginas.

[016 .385 (05]

II. — PERIODICALS.

In French.

Annales des ponts et chaussées. (Paris.)

1932 **691**

nnales des ponts et chaussées, part. tech., septembre-octobre, p. 224.

HENRY (M.). — Note sur la représentation graique de la composition **granulométrique des bétons.** 00 mots & fig.)

1932 **62. (01 & 691**

nnales des ponts et chaussées, part. tech., septembre-octobre, p. 230.

MARCOTTE (E.). — Note au sujet de la **résistance s bétons** de ciments essayés au Laboratoire de l'Ecole tionale des Ponts et Chaussées, de 1927 à 1932. (3.200 ots & fig.)

Annales des travaux publics de Belgique. (Bruxelles.)

1932 **624 .2**

Ann. des travaux publics de Belgique, décembre, p. 847.

VIERENDEEL (A.). — **Dalles sur châssis ou sur** colonnes à chapiteau-champignon. (5 800 mots & fig.)

Arts et Métiers. (Paris.)

1932 **621 .43**

Arts et Métiers, décembre, p. 413.

REIX. — Etude sur les **automotrices et locomotives « Diesel ».** (5 000 mots.)

Bulletin de la Société d'encouragement pour l'industrie nationale. (Paris.)

1932 **621 .131.3 (.44)**

Bull. de la Soc. d'encouragement pour l'industrie nationale, novembre, p. 585.

SAUVAGE (E.). — **Essais de locomotives** sur les chemins de fer de l'Est. (1 200 mots & fig.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1932 **313 .385 (.45)**
Bulletin des transports internationaux par chemins de fer, novembre, p. 573.

Résultats de l'exploitation des chemins de fer italiens de l'Etat pour l'exercice 1930-1931. (2 600 mots.)

1932 **313 .385 (.43)**
Bulletin des transports internationaux par chemins de fer, décembre, p. 631.

Les **chemins de fer allemands** pendant l'exercice 1930. (900 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1932 **621 .43**
Bulletin technique de la Suisse romande, n° 24, 26 novembre, p. 309; n° 25, 10 décembre, p. 321.

Alimentation de moteurs Diesel par turbo-soufflantes. (2 200 mots & fig.)

1932 **621 .132.8**
Bulletin technique de la Suisse romande, n° 25, 10 décembre, p. 326.

Michelines. (400 mots & fig.)

1932 **656 .1 & 656 .2**
Bulletin technique de la Suisse romande, n° 25, 10 décembre, p. 328.

ZEHNDER (R.). — **Rail et route.** (4 000 mots.)

Bulletin technique de l'Union professionnelle des Inspecteurs techniques et des chefs de section des chemins de fer belges. (Bruxelles.)

1932 **621 .143.1**
Bulletin technique de l'Union professionnelle des Inspecteurs techniques et des Chefs de section des Chemins de fer belges, 15 décembre, p. 7.

CALLANT. — Les **rails de grande longueur.** (2 100 mots & fig.)

Chronique des transports. (Paris.)

1932 **385**
Chronique des Transports, n° 23, 10 décembre, p. 2.

Le **problème des chemins de fer.** (3 600 mots.)

Génie civil. (Paris.)

1932 **625 .62 (.432)**
Génie civil, n° 2624, 26 novembre, p. 533.

Dispositif de commande, remplaçant le contrôleur rotatif, adopté sur les tramways de Dresde. (800 mots & fig.)

1932 **62. (01 & 621**
Génie civil, n° 2625, 3 décembre, p. 550.

Les méthodes modernes d'**essais de matériaux** dans la construction des moteurs. (4 600 mots & fig.)

1932 **721 1.**
Génie civil, n° 2625, 3 décembre, p. 553.

MARCOTTE (E.). — La mesure au laboratoire des propriétés des **terrains de fondations.** (3 800 mots & fig.)

1932 **669 .1**
Génie Civil, n° 2625, 3 décembre, p. 558.

JACQUÉ (L.). — L'altération des **aciers** par l'hydrogène. (900 mots.)

1932 **621 .332 (.44)**
Génie civil, n° 2626, 10 décembre, p. 569.

DUMAS (J.). — Le **transport d'énergie** à 220 000 volts du Massif Central à Paris. (6 400 mots & fig.)

1932 **691**
Génie civil, n° 2626, 17 décembre, p. 583; n° 2627, 17 décembre, p. 597; n° 2628, 24 décembre, p. 626.

ANTONI (A.). — Le séchage industriel des **bois.** (14 000 mots & fig.)

1932 **621 .33 (.44)**
Génie civil, n° 2626, 10 décembre, p. 587.

La traction autonome et la **traction électrique** sur les grands réseaux français. (900 mots.)

1932 **62. (01 & 669 .1**
Génie civil, n° 2627, 17 décembre, p. 614.

GALIBOURG (J.). — Singularités des **courbes de traction des aciers à chaud.** (800 mots.)

1932 **625 .5 (.494)**
Génie civil, n° 2628, 24 décembre, p. 621.

LEVY-LAMBERT (A.). — Le **funiculaire** aérien pour voyageurs du Mont Salève, près de Genève. (3 100 mots & fig.)

1932 **191 .1**
Génie civil, n° 2628, 24 décembre, p. 632.

Les perfectionnements récents des fours électriques pour le **traitement de l'acier.** (1 600 mots & fig.)

1932 **621 .43**
Génie civil, n° 2629, 31 décembre, p. 645.

DELANGHE (G.). — Les applications des **moteurs Diesel** à la traction sur voie ferrée. (6 500 mots & fig.)

1932 **624 .63 (.44)**
Génie civil, n° 2629, 31 décembre, p. 654.

CAYLA (M.). — Le **pont en béton armé** des Migneaux, sur la Seine, à Poissy. (1 300 mots & fig.)

1932 **691**
Génie civil, n° 2629, 31 décembre, p. 659.

Dilatation, retrait et élasticité du **béton.** Recherches exécutées par la Société des Forces motrices de l'Oberhasli (Suisse). (1 500 mots.)

L'Allègement dans les Transports. (Lucerne.)

1932 **625 .62**
'Allègement dans les transports, novembre-décembre, p. 98.

TITTELBACH (F.). — L'ossature de support et économie dans la construction de **voitures de tramways.** 4 200 mots & fig.)

La Science et la Vie. (Paris.)

1932 **625 .13**
a Science et la Vie, décembre, p. 465.

ROCHE (C.). — En dix heures, deux **ponts** de 1 800 nnes ont été déplacés. (900 mots & fig.)

La Traction électrique. (Paris.)

1932 **625 .62 (.44)**
a Traction électrique, août, p. 97.

Les nouvelles **voitures motrices** à 3 essieux et à récu-ération des tramways électriques de Lille. — Errata addendum. (500 mots.)

1932 **621 .337**
a Traction électrique, août, p. 98.

HUG (A. M.). — La **commande individuelle des ssieux :** Des systèmes utilisés pour locomotives et otrices dans l'exploitation des voies ferrées de toute ature. (A suivre.) (5 500 mots & fig.)

es Chemins de fer et les Tramways. (Paris.)

1932 **656 .1 (.44) & 656 .2 (.44)**
es Chemins de fer et les Tramways, décembre, p. 204.

Projet d'exploitation par des **services routiers** dans région de Guise. (2 200 mots.)

1932 **621 .13 & 621 .133.1**
es Chemins de fer et les Tramways, décembre, p. 206.

SPIESS (E.). — L'avenir de la **traction à vapeur** et chauffe par combustibles liquides. (5 600 mots.)

1932 **621 .134.3**
es Chemins de fer et les Tramways, décembre, p. 211.

VIC (G.). — Les **locomotives à haute pression.** (3 600 ots & fig.)

1932 **621 .133.7**
s Chemins de fer et les Tramways, décembre, p. 213.

L'épuration des **eaux d'alimentation** des chaudières de omotives. (4 400 mots & fig.)

1932 **656 .212.9 & 656 .225**
s Chemins de fer et les Tramways, décembre, p. 215.

DUCHESNOY. — L'organisation du **transbordement.** 500 mots.)

1932 **625 .143.4**
s Chemins de fer et les Tramways, décembre, p. 220.

GUIRAUD (E.). — Appareil « Speam » pour la esure rapide de la résistance ohmique des **joints des ls.** (1 000 mots & fig.)

1932 **651**
Les Chemins de fer et les Tramways, décembre, p. 222.

Système de **contrôle** et de totalisation des prix des **tickets.** (2 900 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1932 **625 .62**
L'Industrie des voies ferrées et des transports automobiles, novembre, p. 313.

VENTE (R.). — **Controllers** à cames ou équipements à contracteurs. (2 800 mots & fig.)

1932 **621 .33 (06 (.73)**
L'Industrie des voies ferrées et des transports automobiles, novembre, p. 320.

Le 50e Congrès annuel de l'**American Electric Railway Association.** (Atlantic-City, septembre 1931.) (4 400 mots.)

Revue générale des chemins de fer. (Paris.)

1932 **625 .14 (01 & 625 .2 (0**
Revue générale des chemins de fer, décembre, p. 439.

BLONDEL. — La **résistance de la voie** aux oscillations de lacet des véhicules. (7 600 mots & fig.)

1932 **385 (.62)**
Revue générale des chemins de fer, décembre, p. 452.

Les **chemins de fer** de l'Egypte et du Soudan anglo-égyptien. (10 700 mots & cartes.)

1932 **385 .113 (.44)**
Revue générale des chemins de fer, décembre, p. 472.

Les **résultats d'exploitation** du réseau des Chemins de fer de l'Etat français. (6 000 mots.)

1932 **385 .113 (.45)**
Revue générale des chemins de fer, décembre, p. 481.

Les **Chemins de fer** de l'Etat italien pendant les exercices 1929-1930 et 1930-1931. (5 800 mots.)

1932 **625 .144.4 (.44)**
Revue générale des chemins de fer, décembre, p. 490.

Nouvel appareil utilisé par la Compagnie du Nord pour dégarnir, cribler et régaler le **ballast des voies.** (400 mots & fig.)

1933 **625 .23 (0**
Revue générale des chemins de fer, janvier, p. 3.

ROY (M.). — Sur la **résistance aérodynamique** des véhicules de chemin de fer. (8 500 mots.)

1933 **621 .43 (.44)**
Revue générale des chemins de fer, janvier, p. 16.

Locotracteur de 240 chevaux à transmission électrique pour voie de 0.60 m., étudié par l'Office Central d'Etudes de Matériel de chemins de fer. (4 100 mots & fig.)

1933 **625 .172 & 625 .2 (0**
Revue générale des chemins de fer, janvier, p. 25.
MAUZIN. — Un nouvel appareil d'auscultation des **voies** à la Compagnie d'Orléans. (10 000 mots & fig.)

1933 **385 .113 (.44)**
Revue générale des chemins de fer, janvier, p. 50.
Résultats d'exploitation des Chemins de fer d'Alsace et de Lorraine. (4 300 mots.)

1933 **313 .385 (.44)**
Revue générale des chemins de fer, janvier, p. 57.
Résultats obtenus en 1931 sur le réseau des Chemins de fer de l'Etat en France, d'après les comptes d'Administration publiés pour ladite année. (Tableaux.)

1933 **385 .113 (.494)**
Revue générale des chemins de fer, janvier, p. 70.
Les **résultats d'exploitation** des Chemins de fer Fédéraux suisses en 1931. (4 300 mots.)

1933 **621 .335**
Revue générale des chemins de fer, janvier, p. 77.
Addition d'un attelage entre les bogies aux locomotives électriques du type BB de la Compagnie d'Orléans. (1 100 mots & fig.)

Revue politique et parlementaire. (Paris.)

1932 **33**
Revue politique et parlementaire, 10 décembre, p. 452.
ALLIX (E.). — La **semaine de quarante heures** et le chômage. (5 400 mots.)

Revue universelle des Mines. (Liége.)

1932 **531**
Revue universelle des mines, 15 décembre, p. 345.
KESTLICHER (D.). — Nouvelle formule pour le calcul de la perte de charge et de la distribution des vitesses dans les tuyaux polis. (7 700 mots & fig.)

1933 **624 .9**
Revue universelle des mines, 15 décembre, p. 5.
CAMPUS (F.). — Etudes et essais relatifs aux nœuds **de charpente.** (5 300 mots & fig.) (A suivre.)

In German.

Die Lokomotive. (Wien).

1932 **621 .43**
Die Lokomotive, Dezember, S. 217.
JUDTMANN (O.). — **Triebwagen** oder **Schienenauto** III mit elektrischer Kraftübertragung. System Gebus. (3 500 Wörter & Abb.)

1932 **621 .132.6 (.44)**
Die Lokomotive, Dezember, S. 227.
1 E 1 Dreizylinder Tenderlokomotiven der französischen Ostbahn. (2 900 Wörter & Abb.)

Die Reichsbahn. (Berlin.)

1932 **625 .14 (.43)**
Die Reichsbahn, Nr. 38, S. 1005.
MÜLLER. — Der **Oberbau** der Reichsbahn in de Nachkriegszeit. (8 Seiten & Abb.)

1932 **621 .132.**
Die Reichsbahn, Nr. 40, S. 852.
RICHTER-DEVROE. — Bahnhofsprüfzahlen für de **Verschiebelokomotivaufwand.** (4 ½ Seiten.)

1932 **656 .222.**
Die Reichsbahn, Nr. 42, S. 890.
SASSE. — Vorrichtung zur erleichterten **Aufstellung der Fahrpläne** für Sonderzüge. (4 Seiten, Zeich. & Abb.)

Elektrische Bahnen. (Berlin.)

1932 **621 .335 (.43**
Elektrische Bahnen, November, S. 245; Dezember, S. 282
TÖRPISCH (A.). — **Elektrische Bo-Bo Reichsbahn Lokomotive,** Bauart Maffeischwartzkopff. Erster Teil Entwürfe und Ausführung. (5 200 Wörter & Abb.)

1932 **621 .33**
Elektrische Bahnen, November, S. 258.
NORDEN (K.). — **Elektrische Energieübertragun** für Triebwagen mit Verbrennungsmotoren. (3 300 Wörter & Abb.)

1932 **621 .331 (.492) & 625 .6 (.492**
Elektrische Bahnen, November, S. 263.
MÜLLER (G. W.). — Die **selbsttätigen Glasgleichrichteranlagen** der belgischen Nebenbahnen. (2 60 Wörter & Abb.)

1932 **621 .33 (0**
Elektrische Bahnen, Dezember, S. 269.
Die **elektrische Zugbeförderung** auf dem Internationalen Elektrizitäts-Kongress zu Paris, 1932. (11 00 Wörter & Abb.)

1932 **625 .234 (.43**
Elektrische Bahnen, Dezember, S. 289.
RAUCH (A.). — Eine neue Sicherung, angewandt al Verteilungssicherung bei der **elektrischen Zugheizun** der Deutschen Reichsbahn. (1 900 Wörter & Abb.)

Glasers Annalen. (Berlin.)

1932 **621 .33 (.42**
Glasers Annalen, Heft 10, 15. November, S. 79.
WERNEKKE. — Die Einführung **elektrischer Zugförderung** bei den englischen Eisenbahnen. (4 00 Wörter.)

1932 **621 .1**
Glasers Annalen, Heft 11, 1. Dezember, S. 87.
NORDMANN. — Die **mechanik der Zugförderung** in ihrer Entwicklung und ihren neuesten Ergebnissen (8 900 Wörter & Abb.) (Schluss folgt.)

1932 **621 .131.2**
lasers Annalen, Heft 11, 1. Dezember, S. 98.

PONTANI. — Die Bearbeitung der **Lokomotivrahenbacken.** Ein Rückblick. (4 100 Wörter & Abb.)

rgan für die Fortschritte des Eisenbahnwesens. (Berlin.)

1932 **621 .43 (.43)**
gan für die Fortschritte des Eisenbahnwesens, Heft 23, 1. Dezember, S. 435.

NORDEN. — Zweiachsige 120 PS-diesel-elektrische **eichttriebwagen** der Deutschen Reichsbahn-Gesellschaft. 300 Wörter & Abb.)

1932 **625 .141**
gan für die Fortschritte des Eisenbahnwesens, Heft 23, 1. Dezember, S. 440.

PIRATH (C.). — Versuche über Zertrümmerung von **ettungsschotter** unter den Betriebslasten der Eisenhnen. (3 800 Wörter & Abb.)

1932 **625 .212**
gan für die Fortschritte des Eisenbahnwesens, Heft 23, 1. Dezember, S. 445.

KUNZE. — Verbesserung des **Warmeübergangs** bei bremsten Radreifen von Schienenrädern. Versuche und sherige Ergebnisse. (4 200 Wörter & Abb.)

1932 **621 .13 (.43)**
gan für die Fortschritte des Eisenbahnwesens, Heft 24, 15. Dezember, S. 453.

MECKEL (A.). — Die **Normung** im deutschen **ampflokomotivbau.** (7 800 Wörter & Abb.)

1932 **621 .13 (.44)**
gan für die Fortschritte des Eisenbahnwesens, Heft 24, 15. Dezember, S. 465.

DANNECKER (R.). — Neuere französische **Lokootiven.** (4 000 Wörter & Abb.)

1932 **656 .254 (.43)**
gan für die Fortschritte des Eisenbahnwesens, Heft 24, 15. Dezember, S. 471.

BÄSELER. — Eine **mechanische Fahrsperre** über dem eis. (1 300 Wörter & Abb.)

1933 **621 .138.5**
gan für die Fortschritte des Eisenbahnwesens, Heft 1, 1. Januar, S. 1.

SCHWERING. — Die Leistung der **Lokomotivausbesrungswerke** als Funktion der Verkehrsschwankungen. 700 Wörter & Abb.)

1933 **621 .8 (.43)**
gan für die Fortschritte des Eisenbahnwesens, Heft 1, 1. Januar, S. 8.

GIEHLER. — Das **Förderwesen** im Reichsbahnaussserungswerk Berlin. (1 900 Wörter & Abb.)

1933 **625 .143.3**
gan für die Fortschritte des Eisenbahnwesens, Heft 1, 1. Januar, S. 10.

SPINDEL (M.). — Eigenspannungen und Verschleissderstand von **Schienen.** (4 100 Wörter & Abb.)

1933 **625 .14 (01**
Organ für die Fortschritte des Eisenbahnwesens, Heft 1, 1. Januar, S. 16.

Ist die **Bettung** elastisch? (1 200 Wörter & Abb.)

Verkehrstechnische Woche. (Berlin.)

1932 **625 .258**
Verkehrstechnische Woche, Nr. 40, S. 573.

JORDAN. — **Druckluftgesteuerte Gleisbremse** mit selbsttätiger Begrenzung der Bremskraft durch den Raddruck. (5 Seiten, Abb., Zeichn. & Diagr.)

1932 **656 .1 (.43) & 656 .2 (.43)**
Verkehrstechnische Woche, Nr. 40, S. 578.

BURGER. — Das **Kraftwagenproblem** und die Nebenbahnen. (2 ½ Seiten.)

1932 **621 .118**
Verkehrstechnische Woche, Nr. 41, S. 591; Nr. 42, S. 600.

GAISER. — Die **Lokomotivkessel-Explosionen** im Gebiet des Vereins deutscher Eisenbahnverwaltungen. (6 Seiten.)

1932 **656**
Verkehrstechnische Woche, Nr. 42, S. 597.

PIRATH. — Zusammenarbeit der **Verkehrsmittel.** (3 Seiten.)

1932 **656 .222.5**
Verkehrstechnische Woche, Nr. 43, S. 617.

JANISCH. — **Fahrzeiten** für Personenzüge. (4 Seiten.)

1932 **625 .26 (.43)**
Verkehrstechnische Woche, Nr. 44, S. 625; Nr. 45, S. 640.

LEICHER. — Die Arbeitsvorbereitung bei der **Fahrzeugausbesserung** in den Reichsbahn-Ausbesserungswerken. (9 Seiten.)

1932 **656 .212.6**
Verkehrstechnische Woche, Nr. 44, S. 630.

ZINSER. — **Umladung von Grossbehältern** bei der Eisenbahn. (3 Seiten.)

Zeitschrift des Vereines Deutscher Ingenieure. (Berlin.)

1932 **621 .43**
Zeitschrift des Ver. deutsch. Ing., Nr. 50, 10. Dezember, S. 1213.

NÄGEL (A.). — **Versuche an schnellaufenden Dieselmotoren** im Maschinenlaboratorium der Technischen Hochschule Dresden. (3 000 Wörter & Abb.)

1932 **621**
Zeitschrift des Ver. deutsch. Ing., Nr. 50, 10. Dezember, S. 1218.

STELLER (A.). — Leistungsverluste im **Drehkolbenverdichter.** Einfluss der Arbeitsschieber auf den mechanischen Wirkungsgrad. (2 500 Wörter & Abb.)

1932 — 536

Zeitschrift des Ver. deutsch. Ing., Nr. 51, 17. Dezember, S. 1239.

JAKOB (M.). — Sugawaras Gleichungen und Tafeln für Wasser und **Wasserdampf.** (1 100 Wörter.)

1932 — 621 .43

Zeitschrift des Ver. deutsch. Ing., Nr. 51, 17. Dezember, S. 1241.

HOLFELDER (O.). — Der Einspritzvorgang bei **Dieselmotoren.** (2 900 Wörter & Abb.)

1932 — 624 .32 (.433)

Zeitschrift des Ver. deutsch. Ing., Nr. 52, 24. Dezember, S. 1266.

BERNHARD (R.). — **Eisenbahnbrücke** bei Ludwigshafen über den Rhein. (1 800 Wörter & Abb.)

1932 — 621 .9

Zeitschrift des Ver. deutch. Ing., Nr. 53, 31. Dezember, S. 1281.

SCHLESINGER (G.). — Bearbeitbarkeit und **Werkstättenausnutzung.** (8 900 Wörter & Abb.)

Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1932 — 621 .132.8 & 621 .43

Zeitung des Vereins mitteleuropäischer Eisenbahnverw., Nr. 48, 1. Dezember, S. 997.

BÄSELER. — Die **Eisenbahn auf Gummi.** (2 800 Wörter & Abb.)

1932 — 625 .216

Zeitung des Vereins mitteleuropäischer Eisenbahnverw., Nr. 48, 1. Dezember, S. 1003.

SUPPER (C.). — Einrichtung zur Aufzeichnung von **horizontalen Prallstössen an Fahrzeugen** bei der Eisenbahn. (1 600 Wörter & Abb.)

1932 — 621 .138

Zeitung des Vereins mitteleuropäischer Eisenbahnverw., Nr. 49, 8. Dezember, S. 1017; Nr. 50, 15. Dezember, S. 1039; Nr. 51, 22. Dezember, S. 1068.

SCHWERING. — Richtwerte für den Vergleich von **Lokomotiv-Unterhaltungskosten.** Kritische Untersuchungen und Folgerungen. (11 500 Wörter & Abb.)

1932 — 625 .258

Zeitung des Vereins mitteleuropäischer Eisenbahnverw., Nr. 49, 8. Dezember, S. 1025.

WERNER. — Das Auffangen von Wagen mit Hemmschuhen in **Gleiskrümmungen.** (3 200 Wörter & Abb.)

1932 — 625 .245 & 656 .225

Zeitung des Vereins mitteleuropäischer Eisenbahnverw., Nr. 51, 22. December, S. 1066.

BÄSELER. — Zur **Grossbehälterfrage.** (1 000 Wörter.)

1932 — 656 .223.2

Zeitung des Vereins mitteleuropäischer Eisenbahnverw., Nr. 52, 29. Dezember, S. 1077.

SIMON. — Neuere Aufgaben der Vereinsbahnen auf dem Gebiete des **Wagendienstes.** (4 200 Wörter & Abb.)

1932 — 656 .254 (.73)

Zeitung des Vereins mitteleuropäischer Eisenbahnverw., Nr. 52, 29 Dezember, S. 1084.

KRANSKOPF. — Beitrag zu der Frage : **Zugbeeinflussung mit induktiver Übertragung** Studieneindrücke in Nordamerika. (3 200 Wörter & Abb.)

1932 — 625 .143.4

Zeitung des Vereins mitteleuropäischer Eisenbahnverw., Nr. 52, 29. Dezember, S. 1092.

Zur Beseitigung der **Schienenstossfrage.** (3 500 Wörter.)

1933 — 621 .43 (.43)

Zeitung des Vereins mitteleuropäischer Eisenbahnverw., Nr. 1, 5. Januar, S. 33.

Der neue **Schnelltriebwagen** der Deutschen Reichsbahn. (1 000 Wörter & Abb.)

In English.

Bulletin, American Railway Engineering Association. (Chicago.)

1932 — 613 (.73)

Bull., Amer. Ry. Eng. Association, September, p. 81.

Report of Committee XIII. — Water service and sanitation : **Sewage disposal where sanitary facilities are not available.** (2 700 words & fig.)

1932 — 385 .587 (.73) & 625 .17 (.73)

Bull., Amer. Ry. Eng. Association, September, p. 101.

Report of Committee XXII. — Economics of railway labor : Effects of recent **developments in maintenance of way practices on gang organization** (such as use of heavier rail, treated ties and labor-saving devices, which make practicable small section forces, and conducting the major part of maintenance work with extra gangs). — **Standard methods for performing maintenance-of-way** work for the purpose of establishing units of measure of work performed. — Use of motor trucks in maintenance-of-way and structures work. — Gang organization and methods of performing maintenance-of-way work, including revision of time studies now in the manual. (7 000 words, tables & fig.)

1932 — 625 .122 (.73)

Bull., Amer. Ry. Eng. Association, September, p. 131.

Report of Committee I. — Roadway : Investigate the use of **portable cribbing in place of rigid retaining walls** and the utility of the different kinds of cribbing. — **Physical properties of soils and their effect on roadbed performances.** (6 000 words & fig.)

Engineer. (London.)

1932 — 625 .1 (0

Engineer, No. 4012, December 2, p. 559.

SHERRINGTON (C. E. R.). — The position of the **engineer's department.** (2 700 words.)

1932 — 621 .9

Engineer, No. 4012, December 2, p. 568; No. 4013, December 9, p. 587; No. 4014, December 16, p. 624.

TOWN (H. C.). — Modern **hydraulic operation of machine tools.** (6 300 words & fig.)

1932 **313 : 62**
ngineer, No. 4013, December 9, p. 583; No. 4014, December 16, p. 609; No. 4015, December 23, p. 633; No. 4016, December 30, p. 661.

WALTON (D. W.). — **Statistics and engineering.** 3 000 words.)

1932 **385 .4 (.44)**
ngineer, No. 4013, December 9, p. 593.

French railway organisation. (1 300 words.)

1932 **62. (01**
ngineer, No. 4013, December 9, p. 594.

PULLIN (V. E.). — A **portable x-ray laboratory.** 200 words & fig.)

1932 **621 .5**
ngineer, No. 4013, December 9, p. 598.

A compact **portable compressor.** (1 200 words & fig.)

1932 **621 .335 & 621 .43**
ngineer, No. 4015, December 23, p. 638.

Recent progress of the **oil locomotive.** (3 500 words fig.)

1932 **656 .1 (.42) & 656 .2 (.42)**
ngineer, No. 4015, December 23, p. 646.

Conference on **rail and road transport.** (1 700 words.)

1932 **656 .213 (.42)**
ngineer, No. 4015, December 23, p. 650.

New **coal shipping staith at Howdon-on-Tyne.** (1 600 ords & fig.)

1932 **656 .212.6 (.460)**
ngineer, No. 4016, December 30, p. 666.

New **coal handling plant at Gibraltar.** (750 words fig.)

1933 **621 .13 (0, 621 .335 (0 & 621 .43 (0**
gineer, No. 4017, January 6, p. 4.

Locomotive **building in 1932.** (2 000 words & fig.)

1933 **621 .3 (0**
gineer, No. 4017, January 6, p. 9.

Electrical **engineering in 1932.** (6 800 words & fig.)

1933 **621 .33 (.439)**
gineer, No. 4017, January 6, p. 13.

Hungarian **Railways electrification.** (2 000 words & .)

1932 **62. (01 & 669**
e Metallurgist, p. 162, Supplement to the Engineer, No. 4011, November 25.

Investigation of corrosion. Report of Committee B-3 the American Society for Testing Materials on « Cor-sion **of non-ferrous metals and alloys.** (900 words.)

1932 **669 .1**
e Metallurgist, p. 165, Supplement to the Engineer, No. 4011, November 25.

The **casting of ingots.** (1 000 words & fig.)

1932 **62. (01 & 669**
The Metallurgist, p. 167, Supplement to the Engineer, No. 4011, November 25.

Recent American researches on « **fatigue of metals** ». (1 500 words & tables.)

1932 **621 .82 & 669**
The Metallurgist, p. 170, Supplement to the Engineer, No. 4011, November 25.

THEWS (E. R.). — **Melting and pouring white bearing metals.** (2 500 words & 2 tables.)

1932 **62. (01**
The Metallurgist, p. 179, Supplement to the Engineer, No. 4016, December 30.

The time factor in the **tensile test.** (1 100 words.)

1932 **621 .82**
The Metallurgist, p. 182, Supplement to the Engineer, No. 4016, December 30.

White bearing metals. (1 500 words & fig.)

Engineering. (London.)

1932 **621 .335 (.42) & 621 .43 (.42)**
Engineering, No. 3490, December 2, p. 666.

Armstrong-Whitworth **Diesel-electric locomotives.** (1 200 words & fig.)

1932 **62. (01 & 669**
Engineering, No. 3491, December 9, p. 694.

GOUGH (H. J.) & SOPWITH (D. G.). — **Atmospheric action** as a factor in **fatigue of metals.** (5 000 words & fig.)

1932 **621 .335 (.42) & 621 .43 (.42)**
Engineering, No. 3492, December 16, p. 718.

150-B. H. P. **Diesel-electric locomotive.** (1 800 words.)

1932 **621 .9**
Engineering, No. 3492, December 16, p. 723.

TOWN (H. C.). — Modern **hydraulic operation of machine tools.** (5 300 words & fig.)

1932 **656 .212.6 (.42)**
Engineering, No. 3495, December 30, p. 763.

500-ton **coal-loading plant** at Northumberland Dock, Howdon. (1 800 words.)

1932 **536**
Engineering, No. 3495, December 30, p. 763.

Automatic **temperature control apparatus.** (2 200 words & fig.)

1932 **621 .9**
Engineering, No. 3495, December 30, p. 778.

TOWN (H. C.). — Modern **hydraulic operation of machine tools.** (3 300 words & fig.)

Engineering News-Record. (New York.)

1932 **625 .1 (.73)**
Engineering News-Record, No. 21, November 24, p. 609.
Railway construction in Texas Panhandle. (3 200 words & fig.)

1932 **625 .13 (.73)**
Engineering News-Record, No. 21, November 24, p. 620.
Old **tunnel demolished** with trains running. (1 600 words & fig.)

1932 **725 .33**
Engineering News-Record, No. 22, December 1, p. 644.
MEYER (M. B.). — **Foundation** design for an **elevated tank.** (1 300 words & fig.)

1932 **625 .6 (.51)**
Engineering News-Record, No. 25, December 22, p. 745.
Extensive **use of light railways** advocated for **Chinese Republic.** (1 000 words.)

Indian Railway Gazette. (Calcutta.)

1932 **621 .33 (.45)**
Indian Railway Gazette, November, p. 250.
STRAUSS (F.). — **Italian railway electrification.** (2 000 words & fig.)

Journal, Institution of Engineers, Australia. (Sydney.)

1932 **624 .32 (.944)**
Journal, Inst. of Engineers, Australia, November, p. 369.
ROBERTS (J. W.). — The Clarence **river bridge.** (8 500 words & fig.)

Journal, Institute of Transport. (London.)

1932 **347 .763 (.42) & 656 .1 (.42)**
Journal, Institute of Transport, December, p. 65.
HERBERT (E. S.). — The **licensing system** under the **Road Traffic Act,** 1930. (Paper and discussion.) (15 000 words.)

1932 **385 .21 (.42)**
Journal, Institute of Transport, December, p. 87.
PEARSON (A. J.). — **Canals and inland waterways.** (4 300 words & fig.)

1932 **656 .1 & 656 .2**
Journal, Institute of Transport, December, p. 100.
Lecture delivered before the New South Wales transport study circle, Sydney : **Competition between railways and highway transport.** (7 400 words.)

Locomotive, Railway Carriage & Wagon Review (London.)

1932 **621 .132.3 (.44)**
Loc., Ry. Carr. and Wagon Review, December 15, p. 422.
Tests of « **Mountain** » **type locomotive, P. L. M. Ry.** (1 800 words & fig.)

1932 **621 .134.2**
Loc., Ry. Carr. and Wagon Review, December 15, p. 428.
The **Renaud valve gear** for locomotives. (1 600 words & fig.)

1932 **621 .131.2**
Loc., Ry. Carr. and Wagon Review, December 15, p. 439.
PHILLIPSON (E. A.). — **Steam locomotive design** : Data and formulæ. (1 300 words & tables.)

1932 **621 .138.2**
Loc., Ry. Carr. and Wagon Review, December 15, p. 441.
Modern **articulated steam locomotives.** (4 200 words.)

1932 **621 .335**
Loc., Ry. Carr. and Wagon Review, December 15, p. 445.
Electric locomotives design. — VI. — **Effect of motor disposition upon weight distribution.** (500 words & fig.)

1932 **625 .214**
Loc., Ry. Carr. and Wagon Review, December 15, p. 447.
Roller bearing axle boxes for heavy electric vehicles. (600 words & fig.)

1932 **621 .132.8 (.56)**
Loc., Ry. Carr. and Wagon Review, December 15, p. 448.
Steam rail-car : Turkish State Rys. (600 words & fig.)

Modern Transport. (London.)

1932 **385 .11 (.931)**
Modern Transport, No. 715, November 26, p. 3.
Railway position in New Zealand. (2 400 words.)

1932 **656 .1 (.73)**
Modern Transport, No. 715, November 26, p. 4.
American railways and **competition.** Employees initiate **campaign to recover lost traffics.** (2 400 words.)

1932 **621 .43 (.42)**
Modern Transport, No. 715, November 26, p. 5.
Oil-electric traction. Armstrong-Whitworth demonstration. (1 200 words & fig.)

1932 **621 .43 (.42)**
Modern Transport, No. 715, November 26, p. 9.
An **internal combustion steam engine.** (1 400 words & fig.)

1932 **385 (091 (.62)**
Modern Transport, No. 716, December 3, p. 3.
Administration of the Egyptian State Railways. (5 000 words.)

1932 **621 .132**
Modern Transport, No. 716, December 3, p. 9.
WILLIAMS (W. C.). — **Articulated locomotives.** (2 100 words.)

1932 **621 .43 (.42)**
Modern Transport, No. 716, December 3, p. 11.
First **railway-built oil locomotive.** (800 words & fig.)

1932 **385 (091 (.62)**
odern Transport, No. 717, December 10, p. 3.
Administration of the **Egyptian State Railways.** No. 2. **Permanent way, works and rolling stock.** (4 600 ords.)

1932 **656 .255 (.42)**
odern Transport, No. 717, December 10, p. 9.
Innovation on Stanmore line. **Centralised traffic con-ol.** (1 900 words & fig.)

1932 **656 .261 (.42)**
odern Transport, No. 717, December 10, p. 14.
HAMMETT (A. E.). — **Cartage operations** on the uthern Railway. (2 100 words.)

1932 **656 .256.3 (.42)**
odern Transport, No. 718, December 17, p. 3.
Automatic colour-light signalling on L. M. S. R. stallation on Euston-Watford electrified lines. (4 500 ords & fig.)

1932 **385 .1**
odern Transport, No. 718, December 17, p. 6.
WOOD (W. V.). — Some **aspects of transport finance.** nstant and variable items. (2 000 words.)

1932 **621 .33 (.42)**
odern Transport, No. 718, December 17, p. 7.
Electrification of main line railways. Justification Great Britain. (1 200 words.)

1932 **385. (091 (.42)**
odern Transport, No. 718, December 17, p. 8.
Administration of the **Egyptian State Railways.** . 3. — **Traffic and financial results.** (3 500 words.)

1932 **385 .1**
odern Transport, No. 719, December 24, p. 5.
WOOD (W. V.). — Some **aspects of transport finance.** 400 words.)

1932 **621 .33 (.42)**
odern Transport, No. 719, December 24, p. 6.
Electrification of main line railways. (2 600 words.)

1932 **621 .335 (.42) & 625 .232 (.42)**
odern Transport, No. 720, December 31, p. 3.
New cars for London-South Coast services. First **all-el electrically-driven multiple-unit Pullman trains.** 400 words & fig.)

1932 **621 .335 (.82) & 621 .43 (.82)**
odern Transport, No. 720, December 31, p. 7.
Oil-electric locomotives for Argentina. (2 800 words fig.)

1933 **621 .33 (.42)**
odern Transport, No. 721, January 7, p. 5.
Electrification of the **Southern Railway.** Completion main-line scheme to Brighton and Worthing. (6 500 rds & fig.)

1933 **385 .1 (.73)**
Modern Transport, No. 721, January 7, p. 14.
Railway position in the United States. Views of President of Baltimore and Ohio Railroad. (2 400 words.)

1933 **621 .43**
Modern Transport, No. 721, January 7, p. 15.
The **Diesel locomotive.** — Progress during 1932. (1 000 words, 1 table & fig.)

Proceedings, American Society of Civil Engineers (New York.)

1932 **624 .51 (.73)**
Proceed., Amer. Soc. of Civil Eng., December, p. 1661.
DANA (A.), ANDERSEN (A.) & RAPP (G. M.). — George Washington **bridge : Design of superstructure.** (18 000 words & fig.)

1932 **624 .51 (.73)**
Proceed., Amer. Soc. of Civil Eng., December, p. 1727.
MOISSEIFF (L. S.). — George Washington **bridge: Design of the towers.** (9 400 words & fig.)

Railway Age. (New York.)

1932 **625 .244 (.73)**
Railway Age, No. 21, November 19, p. 698.
North American builds **four-wheel refrigerator car.** (1 600 words & fig.)

1932 **385. (06 (.73)**
Railway Age, No. 21, November 19, p. 703.
Railway Business Association holds annual meeting. Resolutions asking **relief for railroads and retirement of government from business.** (3 900 words.)

1932 **625 .142.2 (.73) & 691 (.73)**
Railway Age, No. 21, November 19, p. 709.
Santa Fe constructs **treating plant for hardwood ties.** (2 800 words & fig.)

1932 **625 .15 (.73)**
Railway Age, No. 22, November 26, p. 728.
ALEXANDER (F. W.). — New **tunnel eliminates seven grade crossings** (Canadian Pacific). (2 900 words & fig.)

1932 **313 : 385, 621 .138 & 621 .139**
Railway Age, No. 22, November 26, p. 732.
TITUS (H. J.). Pitfalls in predicting economies. **Statistical methods** insure correct interpretations. (4 500 words & tables.)

1932 **385 .3 (.73)**
Railway Age, No. 24, December 10, p. 859.
Railways propose legislative program. (Plan for **equality of opportunity in transportation.** (8 200 words.)

1932 **621 .133.7 (.73) & 725 .33 (.73)**
Railway Age, No. 24, December 10, p. 865.
Better **water service** pays large returns on Chesapeake and Ohio. (3 900 words & fig.)

1932 625 .234 (.73)
Railway Age, No. 24, December 10, p. 877.
Frigidaire enters **air-conditioning** field. (1 800 words & fig.)

1932 656 .257 (.73)
Railway Age, No. 25, December 17, p. 899.
Simplified **interlockings** installed at Dayton Union Terminal. (3 400 words & fig.)

1932 621 .135.2 (.73)
Railway Age, No. 25, December 17, p. 902.
Double-disc driving wheel. (600 words & fig.)

1932 385 .3 (.73) & 385 .581 (.73)
Railway Age, No. 25, December, p. 911.
Interstate Commerce Commission on **six-hour day** investigation. (4 800 words.)

1932 385 .113 (.73)
Railway Age, No. 25, December 17, p. 917; No. 26, December 24, p. 945.
Interstate Commerce Commission annual report. (Year ended 31 October 1932.) (7 500 words.)

1932 625 .258 (.73) & 656 .212.5 (.73)
Railway Age, No. 26, December 24, p. 998.
Modernizing a large **gravity yard.** (5 300 words & fig.)

1932 656 .1 (.73) & 656 .261 (.73)
Railway Age, No. 26, December 24, p. 952.
YOUNG (L. B.). — Cutting the cost of **storedoor delivery.** (1 600 words & fig.)

1932 656 .225 (.73) & 656 .261 (.73)
Railway Age, No. 26, December 24, p. 955.
New **container and** trailer for co-ordinated service. (1 000 words & fig.)

Railway Engineer. (London.)

1932 621 .138.5 (.42)
Railway Engineer, December, p. 415.
Modernisation of a large **locomotive works.** (2 200 words & fig.)

1933 624 .1 (.44)
Railway Engineer, December, p. 425.
Consolidation of an old masonry viaduct in France. (600 words & fig.)

1933 625 .258 (.44)
Railway Engineer, December, p. 427.
The « R Apparatus » for the **automatic braking of wagons in hump marshalling yards.** (1 800 words & fig.)

1933 625 .151 (.42)
Railway Engineer, December, p. 429.
A new **railway crossing.** (850 words & fig.)

1933 621 .132.3 (.44
Railway Engineer, December, p. 431.
« Mountain » type compound express locomotiv P. L. M. Railway. (1 800 words & fig.)

1933 625 .142.3 (.42
Railway Engineer, December, p. 433.
A new **steel sleeper.** (600 words & fig.)

1932 621 .4
Railway Engineer, December, p. 434.
New **Diesel shunting locomotives.** (900 words & fig.

1932 625 .232 (.42
Railway Engineer, December, p. 439.
The latest **buffet car** on the L. N. E. R. (900 word & fig.)

1933 621 .132.
Railway Engineer, January, p. 1.
Articulated steam locomotives. (900 words.)

1933 621 .132.8 (.47
Railway Engineer, December, p. 3.
A remarkable British-built locomotive for the U. S S. R. (2 200 words & fig.)

1933 621 .132.5 (.51
Railway Engineer, January, p. 11.
New **2-8-2 locomotives** for China. (1 100 words & fig.

1933 625 .172 (.41
Railways Engineer, January, p. 17.
Weed-killing on railways. (700 words & fig.)

1933 656 .256.3 (.42
Railway Engineer, January, p. 19.
Approach-lighted colour-light signalling, L. N. E. (1 200 words & fig.)

1933 625 .244 (.494
Railway Engineer, January, p. 22.
A new type of **mechanically-refrigerated railway va** (1 700 words & fig.)

1933 621 .94 (.42
Railway Engineer, January, p. 25.
Two recent **lathe** designs. (600 words & fig.)

1933 621 .94 (.42
Railway Engineer,: January, p. 26.
New **machine tools for railway shops.** (300 wor & fig.)

Railway Engineering and Maintenance. (Chicago.

1932 625 .143.4 (.73) & 665 .882 (.7
Railway Engineering and Maintenance, December, p. 71
Welding 1 200 joints a day. (3 700 words & fig.)

1932 625 .142.2 (.73) & 691 (.7
Railway Engineering and Maintenance, December, p. 71
Missouri Pacific revises **tie treating specification** (2 400 words.)

932 — 624 (.73) & 691 (.73)
way Engineering and Maintenance, December, p. 717.
ombating **corrosion with oil.** (2 700 words & fig.)

932 — 625 .144.4 (.73)
way Engineering and Maintenance, December, p. 720.
uilding more than **two miles of track per day.** (2 200 ds & fig.)

Railway Gazette. (London.)

932 — 651 (.42) & 656 .257 (.42)
way Gazette, No. 22, November 25, p. 627.
echanisation of **parcels office accounts work** at 's Cross Station, L. N. E. R. (1 100 words & fig.)

932 — 623 (.42)
way Gazette, No. 22, November 25, p. 629.
ie Woolmer **instructional military railway.** (4 000 ls & fig.)

932 — 621 .335 (.42) & 621 .43 (.42)
way Gazette, No. 22, November 25, p. 641.
esel **railway demonstration.** (1 800 words & fig.)

932 — 621 .132.5 (.51)
way Gazette, No. 22, November 25, p. 645.
otable **new locomotives** for China. (1 100 words g.)

932 — 621 .132.8
way Gazette, No. 23, December 2, p. 667.
new form of **articulated steam locomotive.** (1 000 ls & fig.)

932 — 621 .43 (.42)
way Gazette, No. 23, December 2, p. 670.
M. S. **heavy-oil-engined shunting locomotive.** (1 000 ls & fig.)

32 — 621 .43 (.47)
vay Gazette, No. 23, December 2, p. 673.
gh-powered **Diesel locomotives** in Russia. (1 800 s & fig.)

32 — 621 .43 (.42)
vay Gazette, No. 23, December 2, p. 675.
unique **high speed Diesel engine.** (750 words &

32 — 385 .1 (.42)
vay Gazette, No. 24, Deceember 9, p. 699.
ilway **wages inquiry.** (2 500 words & tables.)

32 — 625 .143.1 (.42)
vay Gazette, No. 24, December 9, p. 703.
useful new **rail section.** (250 words & fig.)

32 — 625 .1 (.42)
vay Gazette, No. 24, December 9, p. 704.
w **Metropolitan Railway branch** to Stanmore. (3 000 s & fig.)

1932 — 625 .232 (.51)
Railway Gazette, December 16, p. 737.
New **all-steel passenger coaches** for China. (900 words & fig.)

1932 — 656 .211 (.68) & 725 .31 (.68)
Railway Gazette, December 16, p. 739.
Johannesburg **new station,** South African Railways. (1 400 words & fig.)

1932 — 656 .1 (.41) & 656 .261 (.41)
Railway Gazette, December 16, p. 745.
Door to door transport. (1 700 words & fig.)

1932 — 656 .1 (.42)
Railway Gazette, No. 26, December 23, p. 773.
Salter conference reply. (5 300 words & fig.)

1932 — 656 .255 (.42)
Railway Gazette, No. 26, December 23, p. 777.
A new **centralised traffic control** installation. (1 900 words & fig.)

1932 — 621 .132.8 (.42)
Railway Gazette, No. 26, December 23, p. 780.
New **fireless locomotives.** (1 000 words & fig.)

1932 — 621 .13 (0
Railway Gazette, No. 27, December 30, p. 803.
TUPLIN (W. A.). — **The steam locomotive and its future.** (2 700 words.)

1932 — 621 .43 (.42)
Railway Gazette, No. 27, December 30, p. 805.
Clogher Valley **Diesel railcar.** (1 400 words & fig.)

1932 — 621 .335 (.82) & 621 .43 (.82)
Railway Gazette, No. 27, December 30, p. 807.
Diesel-electric power units for the Buenos Ayres Great Southern Railway. (3 200 words & fig.)

1932 — 621 .43 (.42)
Railway Gazette, No. 27, December 30, p. 811.
B. T. H. — Allen **Diesel-electric shunters.** (1 500 words & fig.)

1933 — 385. (091 (.44)
Railway Gazette, No. 1, January 6, p. 11.
How M. Dautry has rejuvenated the French State Railways. (7 200 words & fig.)

Railway Magazine. (London.)

1933 — 385. (091 (.54)
Railway Magazine, January, p. 1.
MARTEN (E. W.). — A visit to the **Nepal Government Railway.** (1 700 words & fig.)

Railway Mechanical Engineer. (New York.)

1932 — 625 .244 (.73)
Railway Mechanical Engineer, December, p. 481.
Ten-ton **all-steel four-wheel refrigerator car.** (1 300 words & fig.)

1932 621 .133.1 (.73)
Railway Mechanical Engineer, December, p. 485.
Controlling coal consumption. (2 700 words & fig.)

1932 621 .134.3 (.71)
Railway Mechanical Engineer, December, p. 491.
Multi-pressure locomotive on the Canadian Pacific. (6 300 words & fig.)

Railway Signaling. (Chicago.)

1932 656 .256.3
Railway Signaling, December, p. 353.
Pere Marquette installs dwarf signals as automatics in Detroit terminals. (2 200 words & fig.)

1932 656 .256.2 (.73)
Railway Signaling, December, p. 357.
Speed-signaling in England. (2 000 words & fig.)

1932 656 .257 (.73)
Railway Signaling, December, p. 359.
Burlington's reconstruction program at Galesbury involves modern interlocking plants. (3 000 words & fig.)

1932 656 .258 (.73)
Railway Signaling, December, p. 363.
Automatic interlocking protects end of double track. (1 400 words & fig.)

1932 656 .257 (.73)
Railway Signaling, December, p. 366.
Pittsburgh and Lake Erie installs new interlocking at Connellsville, Pa. (800 words & fig.)

In Spanish.

Anales de la Asociacion de Ingenieros del I. C. A. I. (Madrid.)

1932 621 .33 (.460)
Anales de la Asociacion de Ingenieros del I. C. A. I., Diciembre, p. 663.
La estación central de Madrid y la electrificación. (2 200 palabras.)

Ferrocarriles y Tranvias. (Madrid.)

1932 625 .4 (.82)
Ferrocarriles y Tranvias, Octubre, p. 307.
JACKSON (A. H.). — Nueva linea subterránea del Ferrocarril Metropolitano Terminal Central de Buenos Aires. (4 300 palabras & fig.)

1932 656
Ferrocarriles y Tranvias, Octubre, p. 316.
Caracteristicas técnicas actuales de los medios de transportes terrestres. (2 300 palabras & fig.)

Ingenieria y Construcción. (Madrid.)

1932 621 .33 (3
Ingenieria y Construcción, Diciembre, p. 649.
GIBERT y SALINAS (A.). — Notas sobre electrificaciones ferroviarias. (12 700 palabras & fig.)

Revista de Ingenieria Industrial. (Madrid.)

1932 656 .22
Revista de Ingenieria Industrial, Diciembre, p. 393.
PRATS TOMAS (J.). — Fundamentos y descripción del « itinerógrafo ». (3 800 palabras & fig.)

Revista de Obras Públicas. (Madrid.)

1932 624 .6 (0
Revista de Obras Publicas, nº 23, 1º de Diciembre, p. 530.
FERNANDEZ CASADO (C.). — Teoria del arco. (6 000 palabras & fig.)

1932 721 .9 (.43
Revista de Obras Publicas, nº 23, 1º de Diciembre, p. 540.
RIOS (R.). — Las nuevas prescripciones alemanas para las obras de hormigón. (4 800 palabras & fig.)

1933 624 .
Revista de Obras Publicas, nº 1, 1º de Enero, p. 3.
FERNANDEZ CASADO (C.). — Teoria del arco. (3 000 palabras & fig.)

In Italian.

Annali dei lavori pubblici. (Roma.)

1932 621 .392 & 624 .9
Annali dei lavori pubblici, agosto, p. 665.
DONATO (L. F.). — Esperienze su di una ossatura metallica ad elementi saldati, e su saldature. (4 40 parole & fig.)

L'Ingegnere. (Roma.)

1932 6
L'Ingegnere, novembre, p. 774.
STRADELLI (A.). — Teoria e pratica del condizionamento. (4 600 parole & fig.)

1932 624 .2 (
L'Ingegnere, novembre, p. 781.
CROCE (L.). — Sul calcolo delle travi di collegamento. (2 500 parole & fig.)

1932 669
L'Ingegnere, novembre, p. 786.
LERICI (C. M.). — L'acciaio inossidabile metallo dell'avvenire. (2 000 parole & fig.)

1932 624 .63
ngegnere, novembre, p. 794.
ANTONINI (G.). — L'influenza della resistenza a zione del conglomerato nelle sezioni inflesse delle vi di **cemento armato.** (1 300 parole, 3 quadri & fig.)

Notiziario tecnico. (Firenze.)

1932 665 .882
tiziario tecnico, dicembre, p. 321.
La **saldatura autogena** e le deformazioni. (800 parole fig.)

ivista tecnica delle ferrovie italiane. (Roma.)

1932 621 .33 (.45)
vista tecnica delle ferrovie italiane, 15 nov., p. 269.
BENEDETTI (P.). — **Elettrificazione** della Savona-ntimiglia. (7 000 parole & fig.)

1932 624 .63
vista tecnica delle ferrovie italiane, 15 nov., p. 289.
ETTORE LO CIGNO. — La fibra media delle grandi te iperstatiche ed i **ponti ad arco** di cemento armato. 500 parole & fig.)

1932 621 .33 (.45)
vista tecnica delle ferrovie italiane, 15 dic., p. 328.
DALLARCIPRETE (E.). — La **ferrovia elettrica** ma-Civitacastellana-Viterbo. (7 500 parole & fig.)

1932 625 .251 (.4)
vista tecnica delle ferrovie italiane, 15 dic., p. 352.
FASOLI (M.). — Nota sull'applicazione del **freno tinuo** ai treni merci delle ferrovie europee. (4 800 ole & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1932 625 .62
Ingenieur, Nr 49, 2 December, p. 117.
NIEUWENHUIS (J. G. J. C.). — **Tramproblemen.** 300 woorden & fig.)

1932 62. (01
Ingenieur, Nr 50, 9 December, p. 190.
SCHOENMAKER (P.). — **Mechanisch onderzoek van schen.** (6 600 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1932 656 .1 (.492) & 656 .2 (.492)
oor- en Tramwegen, Nr 12, 6 December, p. 295; Nr 13, 20 December, p. 335.
De weg naar **Coördinatie** in het verkeerswezen in derland. (11 400 woorden.) (Wordt vervolgd.)

1932 656 .1 (.94) & 656 .2 (.94)
Spoor- en Tramwegen, Nr 12, 6 December, p. 304.
LODEWYCKX (A.). — **Spoor en auto** in Australië. Pogingen tot coördinatie. (2 800 woorden & fig.)

1932 656 .253
Spoor- en Tramwegen, Nr 13, 20 December, p. 323.
VAN WIJK (V. D.). — De plaats van **blockseinpalen**, bezien uit een oogpunt van treinopvolging. (4 100 woorden & fig.)

1933 621 .132.8 (.56)
Spoor- en Tramwegen, Nr 1, 3 Januari, p. 11.
Nieuwe **stoommotorrijtuigen** der Turksche Staatsspoorwegen. (800 woorden & fig.)

1933 625 .62 (.492)
Spoor- en Tramwegen, Nr 1, 3 Januari, p. 13.
BURGERSDIJCK (W. J.). — De **nieuwe tweelingrijtuigen** der Noord-Zuid-Hollandsche Tramweg Maatschappij. (700 woorden & fig.)

In Polish.
(= 91.885)

Inżynier Kolejowy. (Warsaw.)

1932 625 .235 (.438) = 91 .885
Inzynier Kolejowy, No. 10, p. 216.
OWCZAREK. — **All-steel coaches** of the Polish State Railways. (9 750 words & fig.)

1932 385. (09 (.497.1) = 91 .885
Inzynier Kolejowy, No. 11, p. 236.
SZCZERBOWSKI. — The **Jugoslav Railways** (3 250 words & map.)

1932 621 .132.1 (.497.1) = 91 .885
Inzynier Kolejowy, No. 11, p. 239.
PUPKO. — Railway **rolling stock** and its standardisation. (2 600 words & fig.)

1932 621 .133.7 (.438) = 91 .885
Inzynier Kolejowy, No. 12, p. 246.
The **pump of the « Dabeg » feed water heater** fitted on the Polish series OK 22 locomotives (2 600 words & fig.)

In Portuguese

Boletim do Instituto de Engenharia (S. Paulo). (Brasil.)

1932 313 .385 (.81)
Boletim de Instituto de Engenharia, julho-dezembro, p. 23.
ARAUJO CORREA DE BRITO. — **Estatistica ferroviaria** do Estado de S. Paulo. Relativa ao exercicio de 1929. (4 800 palavras.)

Gazeta dos Caminhos de ferro. (Lisboa.)

1932 **385 (.44)**
Gazeta dos caminhos de ferro, 1° de dezembro, p. 564.
FERNANDO DE SOUSA. — Os **caminhos de ferro** franceses em 1931. (1 900 palavras.)

In Rumanian.

(= 599)

Revista C. F. R. (Bucarest.)

1932 **624 .62 (.498) = 599**
Revista C. F. R., No. 1, p. 27.
ANASTAZIU. — **Steel welded bridge** on the River Berzava, at Resita. (3 200 words & fig.)

1932 **621 .43 = 599**
Revista C. F. R., No. 1, p. 32.
Sulzer 450-H.P. **Diesel-electric locomotive.** (3 600 words & fig.)

1932 **669 = 599**
Revista, C. F. R., No. 1, p. 39.
MAZILU. — The **resilience** of metals. (2 000 words & diagr.)

1932 **621 .132 (.498) = 599**
Revista C. F. R., No. 1, p. 49.
MOCEAROV. — Considerations as regards the **selection of new locomotives** for the Rumanian Railways. (8 000 words & fig.)

1932 **656 .1 (.498) = 599 & 656 .2 (.498) = 599**
Revista C. F. R., No. 2, p. 59.
MACOVEI. — **Road motor transport** and the railways. (2 400 words.)

1932 **621 .137 = 599**
Revista C. F. R., No. 2, p. 63.
POPESCU. — Protecting the **locomotive staff** against smoke. (4 000 words & fig.)

1932 **621 .133.1 (.498) = 599**
Revista C. F. R., No. 2, p. 89.
GANITCHI. — The Rumanian Railways' **fuel supplies** during the war. (11 200 words.)

1932 **621 .133.3 = 599**
Revista C. F. R., Nos. 3-4, p. 108.
MAZILU. — The **effect of mud** in steam boilers. (2 000 words.)

1932 **656 .254 = 599**
Revista C. F. R., Nos. 3-4, p. 111.
CONSTANTIN JOAN. — **Automatic train control and train stop.** (4 000 words & fig.)

1932 **625 .244 (.4) = 599**
Revista C. F. R., Nos. 3-4, p. 116.
FILORIAN. — **Refrigerated wagons** in Europe. (8 800 words & fig.)

1932 **621 .133.7 (.498) = 599**
Revista C. F. R., Nos. 3-4, p. 136.
KERRY. — Improvements effected to the **water taking installation** of the Rumanian State Railways. (1 600 words.)

1932 **621 .133 (01 = 599**
Revista C. F. R., Nos. 3-4, p. 178.
VATAMANU. — **Heat losses** through radiation of the boilers. (4 000 words & fig.)

1932 **625 .143.2 = 599**
Revista C. F. R., Nos. 5-6, p. 183.
LADANY. — The **effect of cooling, after rolling,** on the track equipment. 2 000 words & fig.)

1932 **656 .257 (.498) = 599**
Revista C. F. R., Nos. 7-8, p. 201.
MANOLESCU. — Central **electrically controlled interlocking frame** at the North Station at Bucarest. (12 800 words & fig.)

1932 **721 .9 = 599 & 725 .33 = 599**
Revista C. F. R., Nos. 7-8, p. 241.
ATANASESCU. — **Protection of concrete locomotive sheds** against the effects of smoke. (4 000 words & fig.)

1932 **656 .211 (.45) = 599**
Revista C. F. R., Nos. 9-10, p. 273.
STOÏKA. — The new **Central station** at Milan (6 000 words & fig.)

1932 **625 .233 = 599**
Revista C. F. R., Nos. 9-10, p. 273.
VASU. — Testing **laminated** wagon suspension **springs.** (14 400 words & fig.)

1932 **656 .282 = 599**
Revista C. F. R., Nos. 9-10, p. 301.
ARNAU. — Means used for stopping **straggling wagons.** (6 400 words & fig.)

1932 **621 .114 = 599**
Revista C. F. R., Nos. 9-10, p. 319.
STOENESCU. — Rational **lubrication of engines.** (6 400 words.)

In Serbian.

(= 91.882)

Saobraćajni pregled. (Belgrad.)

1932 **624. (0 (.497.1) = 91 .882**
Saobracajni pregled, No. 10, p. 455.
BURKOVIC. — The safety coefficients for the **calculation of the metal bridges** on the new Kraljevo-Raska-Kosovska Mitrovica railway line. (6 300 words & fig.)

1932 **625 .114 (.497.1) = 91 .882**
obracajni pregled, No. 10, p. 463.
STEHLICK. — New regulations as regards the **load- gauge** on the standard gauge lines. (6 300 words fig.)

1932 **621 .133.1 = 91 .882**
obracajni pregled, No. 10, p. 470.
FINC. — The **efficiency of coal** as regards the locomotive boiler **output.** (1 800 words & fig.)

1932 **621 .133.1 (.497.1) = 91 .882**
obracajni pregled, No. 10, p. 476.
FINC. — Rational **mixing of locomotive coal** from the int of view of evaporation (2 250 words.)

In Czech.

(= 91.886)

Zeleznični Revue. (Prague.)

1932 **385 .3 (.437) = 91 .886**
leznicni Revue, No. 20, p. 305.
CHMELAR. — Can **legislation** make possible the stopping of traffic **on a line** or even the breaking up of this line (2 100 words.)

1932 **656 .222.5 = 91 .886**
Zeleznicni Revue, No. 20, p. 322.
SKACH. — Modern principles applied when the drawing up of **timetables.** (2 100 words.)

Zprávy železničních inženýrů. (Prague)

1932 **621 .43 = 91 .886**
Zprávy zeleznicních inzenyrů, No. 10, p. 175.
VAJNA. — Comparative investigation into the **thermic effects** and the efficiency of the Diesel motor and the spark ignition motor. (5 500 words & diagr.)

1932 **625 .14 (01 = 91 .886 & 625 .22 = 91 .886**
Zprávy zeleznicních inzenyrů, No. 10, p. 175.
DEYL. — **Adaptation of the track** to high train speeds. (7 150 words, fig. & diagr.)

13.944. — M. Weissenbruch Co., Ltd.. Printer of the King. 49, rue du Poinçon, Bruxelles.

MONTHLY BIBLIOGRAPHY OF RAILWAYS (1).

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016 .385. (02]

I. — BOOKS.

In French.

933 62. (0
genda Béranger 1933.
aris et Liége, Librairie polytechnique Béranger. arnet de poche (14 × 19 cm.), 348 pages. (Prix : francs français.)

933 621 .13 (09 (.43)
NAERTS (P.).
orsig et les débuts de la fabrication des locomo- s en Allemagne.
aris, F. H. Turot, 23, avenue de Messine. 1 volume, pages et diagrammes.

932 691. (02, 721 .9 (02 & 624 .63 (02
PITALLIER (M. G.).
ours supérieur de béton armé. Livre I : **Procédés éraux de construction et calcul des ouvrages.** olume, 398 pages, 250 figures. Livre II : **Construc- s en béton armé.** 1 volume, 637 pages, 644 figures. e III : **Les ponts en béton armé** (en impression). aris (Ve), Librairie de l'Enseignement technique, n Eyrolles, 3, rue Thénard. (Prix : Livre I : francs français; Livre II : 90 francs français.)

933 691. (02
RESTIER (V.).
éton armé.
aris, Dunod. Agenda Dunod, 1 volume, 420 pages 246 figures. (Prix : 20 francs français.)

932 621 .13 (.73)
a locomotive à vapeur aux Etats-Unis.
on rôle prédominant dans la lutte soutenue par chemins de fer.
aris (VIIIe), Office de Perfectionnement de la ction autonome sur les chemins de fer, 3, rue Por- s. 1 volume, 36 pages et figures.

1933 721
MAGNY (A. V.).
La construction en béton armé.
Paris et Liége, Ch. Béranger. 1 volume, 719 pages avec 473 figures et atlas de 33 planches. (Prix : 210 francs français.)

1933 385. (02
PLACE (P.).
Chemins de fer.
Paris, Dunod. Agenda Dunod, 1 volume, 400 pages et 62 figures. (Prix : 20 francs français.)

1933 656 .1 & 656 .2
SAITZEW, Professeur.
Mission et régime des chemins de fer dans l'économie nationale. Contribution à l'étude du problème de la concurrence entre le chemin de fer et l'automobile.
Berne, Société anonyme de la Librairie et d'Edition. 1 volume (16 × 24 cm.), 88 pages. (Prix : 1.50 franc suisse.)

In German.

1933 621 .33 (.439)
Die Elektrifizierung der Eisenbahnlinie Budapest-Hegyeshalom nach dem Kandoschen Phasen umformer-System.
Budapest, Ungarischen Staatseisenbahnen. 1 Band, 55 Seiten, 38 Abbildungen und 1 Gesamtschaltschema.

1932 621 .135. (01 & 625 .2 (0
ENGEL (J.).
Die Fahrwiderstände des Rollmaterials im Baubetrieb.
Berlin, Kommission beim VDI-Verlag. 1 Band, 44 Seiten und 47 Abbildungen. (Preis : 7.20 R.M.)

1933 721 .9
GÖLDEL (P.).
Bemessungstafeln für Eisenbetonkonstruktionen.
Leipzig, Johann Ambrosius Barth und Brüssel, Falk, Fils, rue des Paroissiens, 22. 1 Band, 74 Seiten. (Preis: 24 RM.)

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress njointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to ilway Science », by L. WEISSENBRUCH, in the number for November 1897, of the *Bulletin of the International Railway Congress*, 1509).

1933 721 .9 & 621 .392
GREGOR (A.).

Der praktische Stahlhochbau.

Berlin. Robert Kiepert. 1 Band, 128 Seiten und 500 Abbildungen. (Preis : 18.20 R.M.)

1933 721 .9
KERSTEN (C.).

Der Eisenbetonbau.

Berlin. Wilhelm Ernst & Sohn. 1 Band, 262 Seiten, 298 Abbildungen, 23 Zahlentaf. und 28 Zahlenbeisp. (Preis : 8 R.M.)

1933 621 .43
LABRIJN (F.).

Verbrennungsmotor-Lokomotiven und Triebwagen.

Haag, Martinus Nijhoff. 1 Band.

1933 721 .9
SCHAPER (G.).

Grundlagen des Stahlbaues.

Berlin. Wilhelm Ernst & Sohn. 1 Band, 287 Seiten und 421 Abbildungen. (Preis : 9.50 R.M.)

1933 624 .2

Mechanische Schwingungen der Brücken.

Leipzig, Johann Ambrosius Barth und Brüssel, Falk. Fils, rue des Paroissiens, 22. 1 Band, 237 Seiten, Abbildungen und 1 Tafel. (Preis : 6 R.M.)

In English.

1932 385 .4 (.73)
Forty-sixth annual report of the Interstate Commerce Commission, December 1, 1932.

Washington. U. S. Government Printing Office. (9 1/4 × 6 × 1/2 inches), 269 pages. (Price : $ 1.00.)

1933 62. (01 (06 (.73) & 621 .89 (.73)

Petroleum products and lubricants.

Philadelphia, Pa. Published by the American Society for Testing Materials, 1315, Spruce Street, 280 pages. (Price : $ 1.25.)

1932 621 .133.1 (06 (.73)

Proceedings of the International Railway Fuel Association.

Chicago. T. Duff-Smith, secretary-treasurer, International Railway Fuel Association, 1660 Old Colony Building. 171 pages, illust. (Price : $ 3.00.)

1932 385 .1 (.81
DUNCAN (J. S.).

Public and private operation of railways in Brazil.

New York. Columbia University Press. London, P. S King & Son, Ltd. 236 pages. (9 × 6 inches.) (Price 19 sh.)

1932 385. (08 (.68
SOUTH AFRICAN RAILWAYS AND HARBOURS.

Report of the General Manager of Railways an Harbours for the year ended 31st March, 1932.

Pretoria. The Government Printer. 200 pages, illus and a map. (Price : 7 sh. 6 d.)

1932 624 .62 (.944
The Sydney Harbour **bridge**. To commemorate th completion and opening of the Sydney Harbour Bridg — one of the outstanding events for 1932.

Middlesbrough (Great Britain). Published by th contractors. Dorman Long & Co. Ltd. (12 × 9 1/ inches), 90 pages.

In Spanish.

1932 656 .1 & 656 .
BRAVO (J. A.).

Modificaciones a introducir en la explotación de lo ferrocarriles en relación con el transporte mecánico po carretera.

Madrid. Imprenta Gráfica Administrativa. 1 follet (17 × 24 cm.), 61 páginas.

In Italian.

1932 385 .113 (.45
MINISTERO DELLE COMMUNICAZIONI. — AMMINISTRAZIONE DELLE FERROVIE DELL STATO (ITALIA).

Relazione per l'anno finanziario 1931-1932.

Roma, Istituto Poligrafico dello Stato, editore. 1 volume (23 × 32 cm.), pag. XL + 294, con carta 23 tavole.

1933 656. (0
TAJANI (Filippo), Ingenieur.

Trattato moderno di materiale mobile ed esercizi delle ferrovie.

Milano, Libreria Editrice Politecnica, Via G. Pascol 55 & Piazza Cavour, 2. Volume II : Esercizio tecnic Impianto delle stazioni. 1 volume, 430 pagine e figur (Prezzo : 50 Lire.)

016 .385. (05]

II. — PERIODICALS.

In French.

Annales des Ponts et Chaussées (Paris).

1932 **624 .2**
nales des ponts et chaussées, novembre-décembre, partie technique, p. 325.
DESPRETS (R.). — **Actions dynamiques** des charges lantes sur les **ponts** de chemins de fer. (22 300 mots fig.)

Arts et Métiers. (Paris.)

1933 **624 .2**
s et Métiers, janvier, p. 13.
LEXANDRE (R.). — Le calcul des **systèmes hyper-tiques** au moyen du théorème de Castigliano. (8 000 ts & fig.)

Bulletin de la Société d'encouragement pour l'industrie nationale. (Paris.)

932 **691**
l. de la Soc. d'encouragement pour l'industr. nation., décembre, p. 655.
INOT (M.). — La **pervibration,** procédé de serrage omatique du béton. (5 300 mots & fig.)

933 **651 (.44)**
l. de la Soc. d'encouragement pour l'industr. nation., janvier, p. 15.
OLLE (G.). — Directives **mécanographiques** et **canographie** française. (12 400 mots & fig.)

933 **621 .133.3**
l. de la Soc. d'encouragement pour l'industr. nation., janvier, p. 43.
AUVAGE (Ed.). — **Ramoneur à vapeur** Dalmar r locomotives. (600 mots & fig.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

932 **669 .1**
l. de la Soc. des ing. civ. de France, mai-juin, p. 631.
OURDILLON (A.). — Progrès dans les **traitements rmiques des aciers.** (19 400 mots & fig.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

933 **385 .113 (.494)**
l. de l'Union intern. des ch. de fer, janvier, p. 1.
es **Chemins de fer Fédéraux suisses** pendant l'exer- 1931. (8 800 mots.)

1933 **625 .174**
Bull. de l'Union intern. des ch. de fer, janvier, p. 12.
L'influence des **grands froids** sur la voie ferrée. (21 000 mots.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1933 **313 .385 (.489)**
Bull. des transp. intern. par ch. de fer, janvier, p. 43.
Statistique des chemins de fer danois pour l'exercice 1931-1932. (900 mots.)

1933 **313 .385 (.438)**
Bull. des transp. intern. par ch. de fer, février, p. 78.
Les **chemins de fer de l'Etat polonais** pendant l'exercice 1931. (1 600 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1933 **624 .2**
Bull. techn. de la Suisse romande, n° 1, 7 janvier, p. 5.
MEYER (G.). — Calculs des moments fléchissants sur appuis de **poutres** continues à **n** travées. (1 100 mots & fig.)

Chronique des transports. (Paris.)

1933 **385 .113 (.44)**
Chronique des transports, n° 1, 10 janvier, p. 3.
Les **chemins de fer de l'Etat** en 1931. (5 800 mots.)

1933 **656 .1 (.44) & 656 .2 (.44)**
Chronique des transports, n° 4, 25 février, p. 6.
Pour la **coordination** rationnelle des transports ferroviaires et routiers. (5 300 mots.)

Génie civil. (Paris.)

1933 **385 .1 (.44)**
Génie Civil, n° 2630, 7 janvier, p. 9.
DANTIN (Ch.). — Le **déficit** dans l'**exploitation** des grands réseaux français de chemins de fer. (6 000 mots.)

1933 **621 .337 (.43)**
Génie Civil, n° 2631, 14 janvier, p. 40.
Nouveau dispositif de **commande** pour trains à unités multiples du Métropolitain de Berlin. (1 700 mots & fig.)

1933 **621 .335 (.593)**
Génie civil, n° 2631, 14 janvier, p. 45.
Locomotive Diesel-électrique Sulzer de 450 chevaux des Chemins de fer du Siam. (1 400 mots & fig.)

1933 **621 .33 (.439)**
Génie civil, n° 2632, 21 janvier, p. 57.
L'**électrification** d'une section de la ligne de Budapest à Vienne, par les Chemins de fer de l'Etat hongrois. Traction par courants alternatifs, système Kandó. (4 600 mots & fig.)

1933 **621 .33 (06**
Génie Civil, n° 2633, 28 janvier, p. 83.
BARBILLION (L.) et GUERRIER (L.). — La **traction électrique** au Congrès international de l'électricité (1932). (4 500 mots.)

1933 **691**
Génie Civil, n° 2633, 28 janvier, p. 86.
MARCOTTE (E.). — Distinction entre la prise et le durcissement des **ciments** et des **mortiers.** (2 700 mots & fig.)

1933 **621 .13 & 621 .33**
Génie Civil, n° 2634, 4 février, p. 108; n° 2635, 11 février, p. 133; n° 2636, 18 février, p. 155.
FONTY (H.). — L'**exploitation des chemins de fer.** Comparaison entre la **traction à vapeur** et la **traction électrique.** (12 600 mots & 2 tableaux.)

1933 **625 .162 (.73)**
Génie Civil, n° 2635, 11 février, p. 140.
HANSSEN (H. S.). — **Barrière automatique** pour passage à niveau de l'Automatic Safety Signal Gate Co. (900 mots & fig.)

1933 **651 (.44)**
Génie Civil, n° 2637, 25 février, p. 183.
CALAME (P.). — L'emploi des **machines à imprimer les billets** à la Compagnie des Chemins de fer de l'Est. (2 700 mots & fig.)

1933 **621 .33**
Génie Civil, n° 2637, 25 février, p. 187.
La **traction électrique** par courants alternatifs à la fréquence de 50 p/s. (1 300 mots.)

1933 **625 .13 (.73)**
Génie Civil, n° 2637, 25 février, p. 189.
Le **tunnel routier,** sous la Mystic River, à Boston (Etats-Unis). (1 500 mots & fig.)

L'Allègement dans les Transports. (Lucerne.)

1933 **621 .132.8 & 621 .43**
L'Allègement dans les Transports, janv.-févr., p. 4.
RIBERA (J. E.). — La elección del óptimo **autocarril.** (2 800 mots.)

1933 **625 .2**
L'Allègement dans les Transports, janvier-février, p. 19.
DUBATH (H.). — Notice sur quelques automotrices et remorques construites avec utilisation de **métaux légers.** (1 300 mots & fig.)

La Traction électrique. (Paris.)

1933 **621 .33 (.64) & 621 .335 (.64)**
La Traction Electrique, septembre, p. 117.
VALETON. — Les installations et le matériel de **traction électrique** de l'Office chérifien des phosphates. (5 500 mots & fig.)

1933 **621 .335 (.44)**
La Traction Electrique, octobre, p. 131.
PAHIN (L. A. H.). — Les **automotrices électriques à accumulateurs** de la Compagnie des chemins de fer du Sud-Ouest (France). (4 000 mots & fig.)

Les Chemins de fer et les Tramways. (Paris.)

1933 **656 .211 (.44)**
Les Chemins de fer et les Tramways, janvier, p. 3.
DUCHESNOY. — La **nouvelle gare** du Havre. (3 600 mots.)

1933 **621 .132.5 (.44)**
Les Chemins de fer et les Tramways, janvier, p. 6.
SPIESS (E). — **Locomotives à marchandises** du P. L. M. type 1-5-1. (6 500 mots & fig.)

1933 **625 .213**
Les Chemins de fer et les Tramways, janvier, p. 12.
Note concernant le **calcul des ressorts** en spirale. (1 800 mots & fig.)

1933 **625 .215**
Les Chemins de fer et les Tramways, janvier, p. 14.
Bogie extensible pour matériel roulant à voie normale et à voie étroite. (2 300 mots.)

1933 **621 .43**
Les Chemins de fer et les Tramways, janvier, p. 16.
Procédé et appareil pour la **mise en marche de moteurs Diesel** spéciaux pour locomotives. (3 700 mots.)

1933 **625 .142.3**
Les Chemins de fer et les Tramways, janvier, p. 18.
VIE (G.). — L'emploi des **traverses en acier** par les grands réseaux étrangers. (3 700 mots.)

1933 **621 .132.5 (.44)**
Les Chemins de fer et les Tramways, février, p. 28.
Locomotive des Chemins de fer de l'Etat français **type Mountain n° 241-101.** (4 500 mots & fig.)

1933 **656 .256.3**
Les Chemins de fer et les Tramways, février, p. 31.
Blocage automatique des trains, système Kofler. (3 200 mots & fig.)

1933 **621 .132.7 & 621 .43**
Les Chemins de fer et les Tramways, février, p. 36.
Locomotives de manœuvre à moteur Diesel. (3 900 mots & fig.)

1933 **625 .143.5**
Les Chemins de fer et les Tramways, février, p. 44.
Dispositif pour supporter et fixer les rails des voies ferrées. (1 400 mots & fig.)

ndustrie des voies ferrées et des transports automobiles. (Paris.)

932 **656 .1 (06 & 656 .2 (06**
ıd. des voies ferrées et des transp. automobiles, décembre, p. 358.

OURDAIN (P.). — **Comparaison des transports en mun,** chemins de fer d'intérêt local, tramways, omni- automobiles. — Le rail et la route. (10 000 mots.) suivre.)

933 **656 .1 & 656 .2**
ıd. des voies ferrées et des transp. automobiles, janvier, p. 17.

OURDAIN (P.). — **Comparaison des transports en mun,** chemins de fer d'intérêt local, tramways, nibus automobiles. — Le rail et la route. (3 400 ts.) (Fin.)

Revue de l'Ecole polytechnique. (Bruxelles.)

932 **624 .2**
ue de l'Ecole polytechnique, décembre, p. 83.

AES (L.) & VERDEYEN (J.). — Calcul des **poutres** iées. (3 200 mots.)

Revue générale des chemins de fer. (Paris.)

933 **621 .138.5 (.44)**
ue générale des chemins de fer, février, p. 113.

UCHATEL. — L'organisation des travaux de **répa- ion des locomotives et tenders,** ainsi que de pièces essoires diverses dans les ateliers de dépôts de la npagnie des Chemins de fer de l'Est. (17 800 mots tableaux.)

933 **621 .134.3**
ue générale des chemins de fer, février, p. 148.

istribution à phases indépendantes pour moteurs ersibles à fluide élastique et son application aux omotives. (9 300 mots & fig.)

933 **313 .385 (.44)**
ue générale des chemins de fer, février, p. 165.

ésultats obtenus en 1931 sur les Chemins de fer lsace et de Lorraine. (1 500 mots.)

933 **621 .132 (.44)**
ue générale des chemins de fer, février, p. 178.

es principes directeurs de la construction des **loco- tives modernes** du Chemin de fer du Nord. (1 100 s.)

Revue politique et parlementaire. (Paris.)

933 **385. (01 (.6)**
ue politique et parlementaire, 10 janvier, p. 98.

ELIME. — Le rôle du Transsaharien dans l'écono- nationale. (5 800 mots.)

933 **31 & 33**
ue politique et parlementaire, 10 février, p. 271.

ARMILLE (R.). — **Moyens statistiques** et science nomique. (6 300 mots.)

Revue universelle des Mines. (Liége.)

1933 **624 .9**
Revue universelle des mines, 15 janvier, p. 42; 1er février, p. 68.

CAMPUS (F.). — Etudes et essais relatifs aux **nœuds de charpente.** (9 000 mots & fig.)

In German.

Archiv für Eisenbahnwesen. (Berlin.)

1932 **388**
Archiv für Eisenbahnwesen, November-Dezember, S. 1374.

LEHNER (F.). — Die **Linienführung** innerstädtischer Verkehrsmittel. (15 600 Wörter, 7 Tabellen & Abb.)

1932 **385 .517 (.43)**
Archiv für Eisenbahnwesen, November-Dezember, S. 1429.

KUHATSCHECK (O.). — Die **Kranken- und Arbeiterpensionskassen,** die Angestellten, Unfall- und Arbeitslosenversicherung bei der Deutschen Reichsbahn im Jahr 1931. (11 400 Wörter.)

1932 **313 .385 (.43)**
Archiv für Eisenbahnwesen, November-Dezember, S. 1461.

KÜCHLER. — Die **Eisenbahnen** des Deutschen Reichs 1930. (7 600 Wörter.)

1932 **313 .385 (.436)**
Archiv für Eisenbahnwesen, November-Dezember, S. 1505.

ROESNER (E.). — Die **österreichischen Bundesbahnen** im Jahr 1930. (7 900 Wörter.)

1932 **313 .385 (.494)**
Archiv für Eisenbahnwesen, November-Dezember, S. 1536.

NITSCHKE. — Die **Eisenbahnen der Schweiz** im Jahr 1930. (1 500 Wörter.)

1932 **385 .113 (.92)**
Archiv für Eisenbahnwesen, November-Dezember, S. 1544.

OVERMANN. — Die **Eisenbahnen** in Niederländisch-Ostindien. (2 300 Wörter.)

Die Lokomotive. (Wien.)

1933 **621 .335 (.494)**
Die Lokomotive, Jänner, S. 5.

1 Bo 1 Bo 1 + 1 Bo 1 Bo 1 Elektro-Schnellzuglokomotive der Gotthardtbahn. (1 400 Wörter & Abb.)

1933 **625 .253**
Die Lokomotive, Jänner, S. 8.

KUDRNA (J.). — Betriebserfahrungen mit der durchgehenden **Druckluftbremse** (Bauart Bozic). (3 300 Wörter & 2 Tabellen.)

1933 **621 .132.3 (.485)**
Die Lokomotive, Februar, S. 23.

Die 2 C Heissdampf-Schnellzug-Lokomotive « Litt. H » der Schwedischen Ostküstenbahn. (2 100 Wörter & Abb.)

1933 **621 .43 & 621 .132.7**
Die Lokomotive, Februar, S. 26.

MÜLLER (D. W.). — **Dieselelektrische Rangierlokomotive** v. 330 PS. (1 400 Wörter & Abb.)

Die Reichsbahn. (Berlin.)

1932 **385 .113**
Die Reichsbahn, Nr. 47, S. 992.

POKORNY. — Zur Auswertung der **Betriebskostenrechnung.** (3 1/2 Seiten & Diagrams.)

1932 **385 (.43)**
Die Reichsbahn, Nr. 49, S. 1033.

SIEMENS. — **Wirtschaft und Reichsbahn.** Vortrag, gehalten am 3. November 1932 vor dem Bund der Freunde der Technischen Hochschule München. (7 Seiten.)

1932 **621 .132.7 & 621 .43**
Die Reichsbahn, Nr. 50, S. 1050.

TECKLENBURG. — Ein Jahr streckenweiser Einsatz von Kleinlokomotiven. **(Motorrangierlokomotiven.)** (5 Seiten, Zeichn. & Abb.)

Elektrische Bahnen. (Berlin.)

1933 **621 .335 & 621 .392**
Elektrische Bahnen, Heft 1, Januar, S. 1.

REICHEL (W.). — **Elektrische Lokomotive** der Achsfolge Bo-Bo mit geschweissten Rahmen- und anderen neuartigen Bauteilen (Bauart Siemens-Schuckert). (5 000 Wörter & Abb.)

1933 **621 .335 (.73)**
Elektrische Bahnen, Heft 1, Januar, S. 10.

SACHS (K.) & BASTON (C. E.). — Neuere amerikanische **Einphasen Gleichstrom-Umformerlokomotiven.** (2 300 Wörter & Abb.) (Schluss folgt.)

1933 **621 .332**
Elektrische Bahnen, Heft 1, Januar, S. 22.

HUGG (A. M.). — Verringerung des Gewichtes von **Fahrleitungen.** (600 Wörter & Abb.)

Glasers Annalen. (Berlin.)

1932 **621 .13**
Glasers Annalen, Heft 12, 15. Dezember, S. 113.

NORDMANN. — Die Mechanik der **Zugförderung** in ihrer Entwicklung und ihren neuesten Ergebnissen. (5 300 Wörter & Abb.)

1933 **621 .9**
Glasers Annalen, Heft 1, 1. Januar, S. 3.

MAAS (H.). — **Blattfeder-Biege -und Härtemaschinen.** (800 Wörter & Abb.)

Organ für die Fortschritte des Eisenbahnwesens (Berlin.)

1933 **624 .**
Organ für die Fortschritte des Eisenbahnwesens Heft 2, 15. Januar, S. 23.

SCHAECHTERLE (K.). — Modellverfahren zu Ermittlung der inneren Kräfte von beliebig belasteten statisch umbestimmten **Tragwerken** mit Hilfe de Drehwinkelverformungslehre. (3 300 Wörter & Abb.)

1933 **624 .**
Organ für die Fortschritte des Eisenbahnwesens Heft 2, 15. Januar, S. 29.

SCHREIER (J.). — Zur Berechnung der Tragfähigkeit **eiserner Eisenbahnbrücken.** (5 700 Wörter, 4 Tabellen & Abb.)

1933 **625 .17 (.436**
Organ für die Fortschritte des Eisenbahnwesens Heft 2, 15. Januar, S. 39.

HROMATKA (F.). — **Kraftbetriebene Kleinfahrzeuge** des Bahnerhaltungsdienstes bei den Österreichischen Bundesbahnen. (2 400 Wörter & Abb.)

1933 **621 .43 (.43**
Organ für die Fortschritte des Eisenbahnwesens Heft 3, 1 Februar, S. 45.

FUCHS (F.). — Die Entwicklung des **Triebwagens** bei der Deutschen Reichsbahn-Gesellschaft. (7 000 Wörter & Abb.)

1933 **621 .335 (.43) & 621 .43 (.43**
Organ für die Fortschritte des Eisenbahnwesens Heft 3, 1. Februar, S. 55.

HILLE (K.) & NORDEN (K.). — Der 410 PS **Dieselelektrische Triebwagen** der Deutschen Reichsbahn. (4 700 Wörter & Abb.)

1933 **621 .4**
Organ für die Fortschritte des Eisenbahnwesens Heft 3, 1. Februar, S. 63.

RÜTER. — Über die Ermittlung der **Fahrzeiten** vo Diesel-mechanischen Triebwagen nach Zeichnerische Verfahren. (1 900 Wörter & Abb.)

1933 **656 .212.4 & 656 .212.**
Organ für die Fortschritte des Eisenbahnwesens Heft 4, 15. Februar, S. 69.

MASSUTE. — **Verschiebedienst ohne Ablaufanlag** (6 700 Wörter, 3 Tabellen & Abb.)

1933 **656 .25.**
Organ für die Fortschritte des Eisenbahnwesens Heft 4, 15. Februar, S. 79.

GLÄSEL. — Kontrollpunkte und Geschwindigkeitsgrenzen bei der **Zugbeeinflussung** mit punktweise Geschwindigkeitsüberwachung. (3 600 Wörter & Abb.)

Verkehrstechnische Woche. (Berlin.)

1932 **621 .132.8 (.43) & 656 .222.5 (.43.**
Verkehrstechnische Woche, Nr. 47, S. 661; Nr. 4 S. 677; Nr. 49, S. 689.

JÄNECKE. — **Schnellere Personenbeförderung** un Verwendung von Triebwagen bei der Reichsbah (22 Seiten & Diagr.)

.932 **691**
·kehrstechnische Woche, Nr. 48, S. 673.
:OLOFF. — Der **Schutz von Stahlbauten** über Eisen-
ıngleisen gegen Lokomotivrauchgase. (4 Seiten.
chn. & Abb.)

ıtschrift des Vereines Deutscher Ingenieure. (Berlin.)

1933 **624 .63 (.489)**
tsch. des Ver. deutsch. Ing., Nr. 2, 14. Januar, S. 33.
SCHAPER (G.). — Vom Bau der zweigleisigen
enbahn- und Strassenbrücke über den Kleinen Belt.
300 Wörter & Abb.)

1933 **621 .43 (.43)**
tsch. des Ver. deutsch. Ing., Nr. 3, 21. Januar, S. 57.
'UCHS (F.) und BREUER (M.). — Der **Schnell-**
ıbwagen der Deutschen Reichsbahn-Gesellschaft.
)00 Wörter & Abb.)

1933 **669**
tsch. des Ver. deutsch. Ing., Nr. 5, 4. Februar, S. 115.
SACHS (G.). — Fortschritte im **Leichtmetallguss** für
ıe Beanspruchungen. (4 700 Wörter & Abb.)

1933 **621 .43**
tsch. des Ver. deutsch. Ing., Nr. 7, 18 Februar, S. 171.
KLÜSENER (O.) — Zum **Einspritzvorgang** in der
npressorlosen Dieselmaschine. (1 800 Wörter & Abb.)

1933 **669**
tsch. des Ver. deutch. Ing., Nr. 8, 25 Februar, S. 191.
HOUDREMONT (E.) & KALLEN (H.). — Neuere
twicklung auf dem **Edelstahlgebiet.** (3 500 Wörter
Abb.)

Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1933 **656 .225**
tung des Vereins mitteleuropäischer Eisenbahnverw.,
Nr. 3, 19. Januar, S. 65.
REFFLER (D.). — Das Problem der **Stückgutbeför-**
ung. (3 500 Wörter & Abb.)

1933 **614 .8 (.43) & 656 .28 (.43)**
tung des Vereins mitteleuropäischer Eisenbahnverw.,
Nr. 4, 26. Januar, S. 81.
HEIGES. — **Unfallhilfe** bei der Deutschen Reichs-
ın. (2 700 Wörter & Abb.)

1933 **385 .5 (.43)**
tung des Vereins mitteleuropäischer Eisenbahnverw.,
Nr. 5, 2. Februar, S. 101.
ROSER. — Rechtsfragen aus der **Personalwirtschaft**
Deutschen Reichsbahn. (8 500 Wörter.)

1933 **625 .17 (.43)**
tung des Vereins mitteleuropäischer Eisenbahnverw.,
Nr. 6, 9 Februar, S. 121.
LEUSSLER. — **Gleis- und Weichenbautrupps** der
ichsbahn in Wort und Bild. (3 700 Wörter & Abb.)

1933 **385**
Zeitung des Vereins mitteleuropäischer Eisenbahnverw.,
Nr. 8, 23. Februar, S. 161.
SARTER (A.). — Gedanken über die **Leistungs-**
fähigkeit der Eisenbahnen. (7 400 Wörter.)

In English.

Bulletin, American Railway Engineering Association. (Chicago, Ill.)

1932 **016 .656.21 (.73), 656 .21 (.73) & 725 .3 (.73)**
Bull. Amer. Ry Eng. Association, October, p. 167.
Report of Committee XIV: **Yards and terminals (Hump yards. — Location of airports in co-ordination** with railway facilities. — **Scales. — Bibliography of railway stations, yards, marine terminals** and **air ports** [1932], etc.). (1 600 words, tables & fig.)

1932 **656 .237 (.73) & 657 (.73)**
Bull. Amer. Ry. Eng. Association, October, p. 209.
Report of Committee XI: **Records and Accounts (Bibliography** on subjects pertaining to **records and accounts. — Drawings** and drafting room practice : **Graphical symbols. — Forms** used by railway water **service.** — Etc.) (7 800 words, tables & fig.)

1932 **725 .35 (.73)**
Bull. Amer. Ry. Eng. Association, October, p. 251.
Report of Committee XXIII : **Shops and locomotive terminals** (Firing up stations for locomotives. — Turntables. — Etc.). (4 800 words, tables & fig.)

1932 **656 .25 (.73)**
Bull. Amer. Ry. Eng. Association, October, p. 271.
Report of Committee X : **Signals and Interlocking** (Developments of automatic train control. — Signal indications and train orders. — Flashing lights. — Etc.). (5 400 words.)

1932 **691 (.73)**
Bull. Amer. Ry. Eng. Association, October, p. 273.
Report of Special Committee on waterproofing of railway structures (Specifications for membrane waterproofing). (4 800 words.)

1932 **721 .9 (.73)**
Bull. Amer. Ry. Eng. Association, November, p. 285.
Report of Committee XV. — Iron and steel structures. **(Fusion welding and gas cutting for steel structures.** Tentative **specifications for fusion welding and gas cutting** for steel structures. **Repairing of steel bridges.** Etc.) (7 800 words & fig.)

1932 **65 (.73)**
Bull., Amer. Ry. Eng. Association, November, p. 309.
Report of Committee XXVI. — Standardization. (American Standards Association [ASA]. Use and citation of **American standards** [ASA]. Status of **A. R. A. recommended standards for railroad highway grade crossing protection. Standards approved** by the American Standards Association. — Etc.) (7 200 words & fig.)

1932 **625 .142.2 (.73)**
Bull., Amer. Ry. Eng. Association, November, p. 323.

Report of Committee III. — **Ties. (Substitute ties.** Method illustrating how tie renewals may be predicted under a program involving the **change from the use of untreated to treated ties.** Most economical **method of distributing ties** from treating plants to points where they are to be used. — Etc.) (6 000 words.)

1932 **625 .144.4 (.73) & 625 .17 (.73)**
Bull., Amer. Ry. Eng. Association, November, p. 355.

Report of Committee XXVII. — Maintenance of way work equipment. (Types of **snow-melting devices** as an aid in facilitating train operation and reducing maintenance cost. Use and adaptability of **track type tractors in maintenance of way work. Tie adzing, scoring and boring machines.** — Etc.) (15 000 words & fig.)

1932 **625 .142.2 (.73) & 691 (.73)**
Bull., Amer. Ry. Eng. Association, December. p. 421.

Report of Committee XVII. — **Wood preservation.** (Service **test records for treated ties.** Piling used for marine construction. **Specifications for treatment** of air-seasoned Douglas Fir. **Destruction by termite** and possible ways of **prevention.** Methods of **protection of treated materials** in the field. — Etc.) (15 600 words & fig.)

1932 **625 .14 (.73), 625 .15 (.73) & 625 .17 (.73)**
Bull., Amer. Ry. Eng. Association, December, p. 491.

Report of Committee V. — Track. (**String lining of curves by the chord method** and preparation of tables suitable for the use of trackmen. **Plans and specifications for track tools. Plans for switches, frogs, crossings, slip switches.** — Etc.) (9 600 words & tables.)

1932 **625 .141 (.73)**
Bull., Amer. Ry. Eng. Association, December, p. 521.

Report of Committee II. — **Ballast.** (**Specifications** for prepared gravel ballast, including best method of **testing for hardness, abrasion and resistance to weathering.** Summary of **questionnaire on use of Association's specifications** for prepared gravel ballast. **Specifications for stone ballast,** including best method of testing resistance to weathering. — Etc.) (5 400 words & fig.)

1933 **656 .2 (.73)**
Bull., Amer. Ry. Eng. Association, January, p. 533.

Report of Committee XXI. — Economics of railway operation. (Forecast of **improvement in train operation of a single track railroad equipped with short sections of double track** with spring switches and C. T. C., controled manual block. Methods for determining the **most economical train length,** considering all factors entering into locomotive development. **Transportation costs.)** (12 000 words, tables & fig.)

1933 **69 (.72) & 72 (.73)**
Bull., Amer. Ry. Eng. Association, January, p. 577.

Report of Committee VIII. — Masonry. (**Specifications** and principles of design of **plain and reinforced concrete rigid frame bridges.** Progress in the science and art of **concrete manufacture. Specifications for repairing deteriorating concrete. Design of expansion joints involving masonry structures.** (8 400 words & fig.)

1933 **313 : 625 .143.3 (.73) & 625 .143 (.7**
Bull., Amer. Ry. Eng. Association, January, p. 605.

Report of Committee IV. — Rail. (**Standard specifi cations of carbon steel rails.** — Details of **mill practi and manufacture** as they affect rail quality and ra failures. **Rail failure statistics for 1931. Transver fissure statistics. Operating results of the A. R. A. ra fissure detector car.** Specifications for **spring washer Relative merits of rail sections heavier than 100 l per yard** from the standpoint of economical distributi of metal and strength. Compilation of information **tests of alloy and of heat-treated carbon steel rail** — Etc.) (7 800 words & tables.)

Engineer. (London.)

1933 **656 .253 (.42**
Engineer, No. 4018, January 13, p. 34.

The **re-signalling** of Brighton station. (3 800 wor & fig.)

1933 **385. (.42**
Engineer, No. 4018, January 13, p. 39.

British railways in 1932. (3 500 words.)

1933 **621 .33 (.439**
Engineer, No. 4018, January 13, p. 48.

Hungarian Railways **electrification.** (2 000 words fig.)

1933 **621 .86 (.42**
Engineer, No. 4018, January 13, p. 50.

25-ton **overhead travelling crane** for Great Weste Ry. (700 words & fig.)

1933 **621 .335 (.42) & 621 .43 (.42**
Engineer, No. 4019, January 20, p. 66.

FELL (L. F. R.). — **The compression-ignition engi and British railways.** (4 000 words, 1 table & fig.)

1933 **621 .335 (.42) & 621 .43 (.42**
Engineer. No. 4019, January 20, p. 71.

Oil locomotives. (1 700 words.)

1933 **621 .335 (.42) & 621 .43 (.42**
Engineer. No. 4019, January 20, p. 72.

Oil-electric locomotives. (3 300 words.)

1933 **621 .132.3 (.41**
Engineer, No. 4020, January 27, p. 98.

Three-cylinder compound locomotive, Great Northe Railway (Ireland). (1 200 words & fig.)

1933 **53**
Engineer, No. 4021, February 3, p. 108.

MORLEY (T. B.). — **Heat transference in supe heaters.** (2 500 words.)

1933 **656 .212.6 (.71) & 725 .36 (.71**
Engineer, No. 4021, February 3, p. 120.

The **handling and storing of grain.** (2 300 words.)

1933 **721 .9 & 725 .36**
ngineer, No. 4022, February 10, p. 134.
BROUGHTON (H. H.). — **Moving forms for con-ete construction. Grain elevator,** Baltimore & Ohio R. (1 700 words & fig.)

1933 **621 .135.2**
ngineer, No. 4022, February 10, p. 135.
DALBY (W. E.). — Optimum **diameter of driving heels.** (3 800 words.)

1933 **621 .332 (.436)**
ngineer, No. 4022, February 10, p. 145.
The Kandó system **(electric traction).** (1 800 words.)

1933 **621 .43 (.729)**
ngineer, No. 4022, February 10, p. 151.
Bermuda Railway **motor freight locomotive.** (200 ords & fig.)

1933 **62 (01 (.42)**
ngineer, No. 4022, February 10, p. 152.
500-ton **compression testing machine.** (1 200 words fig.)

Engineering. (London.)

1933 **656 .222.1 (.44)**
ngineering, No. 3496, January 13, p. 31.
Lord MONKSWELL. — **French locomotive perfor-ance** in 1932. (6 600 words & fig.)

1933 **621 .33 (.439)**
ngineering, No. 3496, January 13, p. 58.
The Kando system of **electric traction** on the Hun-rian State Railways. (2 000 words & fig.)

1933 **625 .4 (.44)**
ngineering, No. 3497, January 20, p. 61.
RICH (Th.). — The development of the Paris Metro-litan **Ry.** (2 600 words & fig.)

1933 **536 & 669**
ngineering, No. 3497, January 20, p. 67.
Temperature measurement and control. (1 800 words fig.)

1933 **621 .39 & 669 .1**
ngineering, No. 3497, January 20, p. 68.
The application of the thermo-magnetic cycle to the **ardening of steels.** (Tables.)

1933 **621 .43**
ngineering, No. 3497, January 20, p. 85.
FELL (Lt.-Col. L. F. R.). — The **compression-ignition gine and its applicability to British railway traction.** 5 000 words, 1 table & fig.)

1933 **016 & 0 .254**
ngineering, No. 3499, February 3, p. 119.
BRADFORD (S. C.). — The **international indexing f scientific and technical papers.** (4 900 words.)

1932 **625 .4 (.44)**
Engineering, No. 3499, February 3, p. 122.
RICH (Th.). — The development of the **Paris Metro-politain Railway.** (700 words & fig.)

1933 **621 .33**
Engineering, No. 3499, February 3, p. 133.
Progress in electric traction. (2 500 words.)

1933 **625 .36 (.82)**
Engineering, No. 3500, February 10, p. 147; No. 3502, February 24, p. 205.
80 000-ton **granary** at Bahia Blanca. (8 900 words & fig.)

1933 **62. (01**
Engineering, No. 3500, February 10, p. 176.
500-ton self-indicating **compression testing machine.** (1 000 words & fig.)

1933 **725 .36**
Engineering, No. 3501, February 17, p. 199.
BROUGHTON (H. H.). — The **handling and storing of grain,** with special reference to **Canadian methods.** (4 600 words & fig.)

1935 **621 .13, 621 .335 & 621 .43**
Engineering, No. 3502, February 24, p. 226.
UNWIN (C. B.). — **Railway operation and electric rolling stock.** (2 200 words.)

1933 **621 .33 (.436)**
Engineering, No. 3502, February 24, p. 232.
Electric traction in Austria. (1 500 words.)

Engineering News-Record. (New York.)

1932 **725 .3 (.73)**
Engineering News-Record, No. 26, December 29, p. 768.
Off-rail Union Terminal built in New York. (3 000 words & fig.)

1933 **621 .392 & 721 .9**
Engineering News-Record, No. 26, December 29, p. 773.
FISH (G. D.). — Principles and practice in **welded joint design.** (4 900 words & fig.)

1933 **624 .7 (.73)**
Engineering News-Record, No. 2, January 12, p. 43.
Varied **steel-erection practice** on New Jersey **viaduct.** (4 600 words & fig.)

1933 **625 .13 (.73)**
Engineering News-Record, No. 2, January 12, p. 57.
FERGUSON (J. B.). — **Repairing bridge piers of disintegrated concrete.** (700 words & fig.)

1933 **624 .7 (.73)**
Engineering News-Record, No. 6, February 9, p. 179.
COHEN (A. B.). — Three-level **rail and road cross-ing.** (3 200 words & fig.)

Indian Railway Gazette. (Calcutta.)

1933 **625 .14 (.43)**

The Indian Railway Gazette, February, p. 31.

The German State Railway Company's tendency for **a standard permanent way.** (3 300 words.)

Journal, Institution of Engineers, Australia. (Sydney.)

1932 **624 .32 (.944)**

Journal, Institut. of Eng., Australia, December, p. 405.

ROBERTS (J. W.). — The Clarence **river bridge.** Part II : **Construction.** (8 600 words & fig.)

Journal, Institute of Transport. (London.)

1933 **621 .33 (.42)**

Journal. Institute of Transport, January, p. 133.

LYDALL (F.). — British **main line electrification.** (19 000 words & fig.)

1933 **347 .763 (.3)**

Journal, Institute of Transport, January, p. 162.

SHERRINGTON (C. E. R.). — **Government control of road transport** abroad. (1 000 words & fig.)

1933 **656 .29**

Journal, Institute of Transport, January, p. 173.

BROOKS (G. H.). — **Inducing the public to travel.** (500 words.)

1933 **385. (071**

Journal, Institute of Transport, February, p. 221.

PICK (F.). — **Education for transport.** (20 000 words.)

1933 **656 .237**

Journal, Institute of Transport, February, p. 241.

TRYE (H. N.). — **Traffic audit procedure and problems.** (9 000 words.)

Journal, Permanent Way Institution. (Woking.,

1932 **625 .17**

Journal, Perm. Way Institution, December, p. 298.

SHERRINGTON (C. E. R.). — The **Engineer's Department.** An **economic viewpoint.** (6 400 words.)

1932 **625 .173**

Journal, Perm. Way Institution, December, p. 314.

TAZEWELL (B.). — **Relaying** from a permanent way inspector's standpoint. (6 500 words.)

1932 **656 .254**

Journal, Perm. Way Institution, December, p. 331.

CROOK (G. H.). -- **Automatic train control.** (5 800 words & fig.)

1932 **385 .4**

Journal, Perm. Way Institution, December, p. 352.

KNOTTS (L. J. M.). — **Departmental co-operation.** (5 800 words.)

The Locomotive. (London.)

1933 **621 .132.3 (.44**

The Locomotive, January 14, p. 3.

Three-cylinder « Mountain » type express locomotiv French State Rys. (650 words & fig.)

1933 **621 .132.8 (.47**

The Locomotive, January 14, p 4.

Beyer-Garratt locomotive for the U. S. S. R. Ry (2 900 words & fig.)

1933 **621 .131**

The Locomotive, January 14, p. 11.

PHILLIPSON (E. A.). — **Steam locomotive designi data and formulæ.** (2 000 words & fig.)

1933 **385 .1 (.42**

The Locomotive, January 14, p. 14.

Views of a locomotive engineer on home railwa operation under present conditions. (2 200 words.)

1933 **621 .335 (.82) & 621 .43 (.82**

The Locomotive, January 14, p. 18.

Diesel-electric power units, Buenos Ayres Grea Southern Ry. (3 300 words & fig.)

1933 **625 .232 (.42)**

The Locomotive, January 14, p. 24.

New **Pullman cars** for the Brighton and Worthin services. (2 500 words & fig.)

1933 **621 .132.3 (.4**

The Locomotive, February 15, p. 32.

Three-cylinder « Mountain » type express locomotiv (700 words & fig.)

1933 **621 .132.5 (.73**

The Locomotive, February 15, p. 39.

POULTNEY (E. C.). — Large **2-10-4 type locomoti** Atcheson, Topeka and Santa Fe RR. (2 200 words fig.)

1933 **621 .43 (.8**

The Locomotive, February 15, p. 50.

Petrol engined rail-car, Buenos Ayres & Pacific R (2 000 words & fig.)

1933 **621 .43 (.4**

The Locomotive, February 15, p. 56.

An Italian **articulated rail-car.** (300 words & fig.)

Mechanical Engineering. (New York.)

1933 **5**

Mechanical Engineering, February, p. 113.

KEYES (F. G.) & SMITH (L. B.). — **Steam researc** (3 600 words & fig.)

Modern Transport. (London.)

1933 **621 .33 (.43**

Modern Transport, No. 722, January 14, p. 3.

Electrification of Hungarian State Railways. (3 8 words & fig.)

1933 621 .132.3 (.44)
Modern Transport, No. 722, January 14, p. 7.
New **three-cylinder express passenger locomotive** for French State Railways. (1 300 words & fig.)

1933 385 (071
Modern Transport, No. 723, January 21, p. 3.
PICK (F.). — **Education for transport. Co-ordination or transport.** (3 200 words.)

1933 621 .43 (.42)
Modern Transport, No. 723, January 21, p. 6.
Compression-ignition engines for rail traction. (1 200 words.)

1933 621 .33 (.485)
Modern Transport, No. 723. January 21, p. 7.
ÖFVERHOLM (I.). — **Railway electrification** in Sweden. (2 200 words.)

1933 385 .113 (.68)
Modern Transport, No. 723, January 21, p. 9.
South African Railways. Results during 1932. (2 000 words.)

1933 656 .256.3 (.42)
Modern Transport, No. 724, January 28, p. 3.
BOUND (A. F.). — **Automatic signalling. Equipment and method of operation.** (3 900 words.)

1933 656 .234 (.42)
Modern Transport, No. 724, January 28, p. 5.
Industrial traffic management. **Traders' travel concessions.** (1 500 words.)

1933 656 .231 (.42)
Modern Transport, No. 724, January 28, p. 7.
Six-wheeled **brake vans** for London Midland & Scottish Ry. (500 words & fig.)

1933 385. (061 (.62)
Modern Transport, No. 725, February 4, p. 3.
International Railway Congress. — Inaugural ceremony at Cairo. — The **Railway Museum.** — Social activities. (3 000 words.)

1933 621 .13, 621 .335 & 621 .43
Modern Transport, No. 725, February 4, p. 5.
Advantages of various systems of traction. — Steam, Diesel and electric. (2 800 words.)

1933 656 .222.3 (.44)
Modern Transport, No. 725, February 4, p. 9.
Railway problems in France. Experiments with **light units.** (1 200 words.)

1933 621 .43 (.729)
Modern Transport, No. 726, February 11, p. 3.
Petrol locomotives for Bermuda. Two 300-h.-p. Drewry units. (1 000 words & fig.)

1933 385 .1 (.66)
Modern Transport, No. 726, February 11, p. 4.
Railway administration in East Africa. (2 000 words.)

1933 656 .1 & 656 .2
Modern Transport, No. 726, February 11, p. 5.
Railways and road transport. — Cairo Congress advocates monopoly. (4 800 words.)

1933 656 .256
Modern Transport, No. 726, February 11, p. 7.
CHALLIS (W.). — Progress in **railway signalling. — Track circuiting** developments. (1 600 words.)

1933 656 .225
Modern Transport, No. 727, February 18, p. 3.
MAYNARD (A.). — **Co-ordination of goods transport.** Railway methods reviewed. (1 600 words.)

1933 656 .1 (.42) & 656 .2 (.42)
Modern Transport, No. 727, February 18, p. 4.
Railways and road transport. — Sir Arthur Salter's views. (1 600 words.)

1933 656
Modern Transport, No. 727, February 18, p. 5.
WOODS HUMPHERY (G. E.). — **Transport by air.** Economic problems and their solution. (2 500 words.)

1933 625 .245 (.42)
Modern Transport, No. 727, February 18, p. 8.
New type of **coal wagon for side tipping and bagging.** (700 words & fig.)

1933 621 .43 (.42)
Modern Transport, No. 727, February 18, p. 11.
The Hunslet **heavy oil locomotive.** Tests in service. (1 100 words & fig.)

Proceedings, American Society of Civil Engineers. (New York.)

1933 624 .51 (.73)
Proc., Amer. Soc. of Civil Eng., January, p. 29.
CASE (M. B.). — George Washington **bridge** : Construction of **substructure.** (9 800 words & fig.)

1933 624 .51 (.73)
Proc., Amer. Soc. of Civil Eng., January, p. 65.
BOWDEN (E. W.), SEELY (H. R.). — George Washington **bridge** : Construction of the **steel superstructure.** (25 000 words & fig.)

1933 624 .51 (.73)
Proc., Amer. Soc. of Civil Eng., January, p. 196.
SCHWARZE (C. T.). — George Washington **bridge : General conception and development of design.** (Discussion.) (1 000 words.)

1933 621 .392 & 721 .3
Proc., Amer. Soc. of Civil Eng., January, p. 199.
ROARK (R. J.) and KIRKLEY (L. F.). — Tests of **riveted and welded steel columns.** (Discussion.) (2 300 words.)

1933 **624 .51 (.73)**
Proc., Amer. Soc. of Civil Eng., February, p. 269.
BAKER (H. J.). — George Washington **bridge: Materials and fabrication of steel structure.** (13 500 words, 14 tables & fig.)

1933 **624 .51 (.73)**
Proc., Amer. Soc. of Civil Eng., February, p. 317.
EVANS (J. C.). — George Washington **bridge: Approaches** and **highway connections.** (9 800 words & fig.)

1933 **624 .51 (.73)**
Proc., Amer. Soc. of Civil Eng., February, p. 369.
LINDENTHAL (G.) and LEWIS (H. M.). — George Washington **bridge: General conception and development of design.** (Discussion.) (3 000 words & fig.)

Railway Age. (New York.)

1932 **621 .139, 625 .18 & 625 .27**
Railway Age, No. 27, December 31, p. 970.
Canadian National **stores control methods** stand time. (3 000 words & fig.)

1932 **621 .335 (.73)**
Railway Age, No. 27, December 31, p. 975.
300-h.p. **Diesel-electric locomotive** reduces operating expense. (600 words & fig.)

1932 **313 : 625 .17 (.73)**
Railway Age, No. 27, December 31, p. 977.
Tables show marked **reductions in maintenance of way.** (900 words & 4 tables.)

1932 **621 .43 & 625 .212**
Railway Age, No. 27, December 31, p. 981.
Tests of Firestone **pneumatic rail tires.** (1 200 words & fig.)

1933 **385. (072 (.73) & 625 .14 (.73)**
Railway Age, No. 1, January 7, p. 11.
Are the **railways** backward in **research and test work?** (4 000 words & fig.)

1933 **656 .259 (.73)**
Railway Age, No. 1, January 7, p. 15.
Canadian Pacific installs **signaling for tunnel,** (1 300 words & fig.)

1933 **621 .335 (.47)**
Railway Age, No. 1, January 7, p. 17.
CAIN (B. S.). — **Electric locomotives** for Russia. (1 300 words & fig.)

1933 **625 .245 (.73)**
Railway Age, No. 2, January 14, p. 36.
BLOCH (O. M.). — **All-welded cars for transporting transformers.** (1 900 words & fig.)

1933 **625 .122 (.73)**
Railway Age, No. 2, January 14, p. 41.
Jetting solidifies large **embankment.** (2 500 words & fig.)

1933 **385 (.7**
Railway Age, No. 3, January 21, p. 75.
The story of the December 3 issue. (Presentati of **the case for the great railway industry.**) (6 0 words.)

1933 **625 .253 (.7**
Railway Age, No. 4, January 28, p. 98.
New air brake will reduce costs of operation a facilitate freight movement. (5 000 words & fig.)

1933 **656 .261 (.7**
Railway Age, No. 4, January 28, p. 115.
LULL (H. M.). — How the Texas and New Orlea provides **store-door service** to shippers. (1 300 word

1933 **347 .763 (.7**
Railway Age, No. 4, January 28, p. 117.
State motor vehicle legislation. (Up-to-date comp lation **of state laws governing highway carriers** (4 000 words.)

1933 **385 .1 (.7**
Railway Age, No. 5, February 4, p. 129.
Railway trends in 1932 and **prospects for 1933.** (4 6 words.)

1933 **385 .113 (.7**
Railway Age, No. 5, February 4, p. 134.
PARMELEE (Dr. J. H.). — A review of **railwa operations in 1932.** (9 000 words & tables.)

1933 **313 : 625 .17 (.71 + .7**
Railway Age, No. 5, February 4, p. 149.
Three years of under-**maintenance.** (3 500 wor & fig.)

1933 **313 : 625 .1 (.71 + .7**
Railway Age, No. 5, February 4, p. 153.
BOYD (G. E.). — **Railway construction** at low c (2 600 words & fig.)

1933 **385 .1 (.7**
Railway Age, No. 5, February 4, p. 160.
LYNE (J. G.). — The worst results in history ma **railway finances in 1932.** (2 600 words & tables.)

1933 **313 : 621 .139 (.73), 313 : 625 .18 (.7 & 313 : 625 .27 (.7**
Railway Age, No. 5, February 4, p. 165.
STEEL (D. A.). — **Cost of railway materials** redu **ed in 1932.** (2 600 words & fig.)

1933 **313 : 621 .13 (.71 + .7**
Railway Age, No. 5, February 4, p. 171.
TAFT (W. J.). — **Locomotives ordered in 1932.** (1 0 words & tables.)

1933 **313 : 625 .24 (.71 + .7**
Railway Age, No. 5, February 4, p. 173.
KRAEGER (F. W.). — **Freight cars ordered** 1932. (900 words & tables.)

1933 **313 : 625 .23 (.71 + .73)**
ilway Age, No. 5, February 4, p. 175.
HUDSON (G. C.). — **Passenger car orders in 1932.** 50 words & tables.

1933 **313 : 621 .43 (.71 + .73)**
ilway Age, No. 5, February 4, p. 177.
PECK (C. B.). — **Rail motor cars** are still in demand. 70 words, tables & fig.)

1933 **313 : 656 .25 (.71 + .73)**
ilway Age, No. 5, February 4, p. 179.
DUNN (J. H.). — **Signal construction during 1932.** 800 words & tables.)

1933 **313 : 656 .1 (.71 + .73)**
ilway Age, No. 5, February 4, p. 183.
EMERY (J. C.). **Railway truck use greatly extended.** 00 words & fig.)

1933 **313 : 656 .254 (.71 + .73)**
ilway Age, No. 5, February 4, p. 185.
HAMILTON (S. R.). — **Communication activities** rtailed. (750 words.)

1933 **625 .24 (0 (.73)**
ilway Age, No. 6, February 11, p. 209.
PECK (C. B.). — The changing **freight car.** (4 300 ords & 1 table.)

1933 **624 (.73)**
ilway Age, No. 7, February 18, p. 236.
BURTON COHEN. (A.). — **Three-level crossing** volves interesting bridges. (2 500 words & fig.)

1933 **656 .257 (.73)**
ilway Age, No. 7, February 18, p. 240.
Two groups of **consolidated interlockings.** (1 300 rds & fig.)

1933 **621 .131.1**
ilway Age, No. 7, February 18, p. 243.
LIPETZ (A. I.). — **Horsepower of modern locomo-ves.** (3 300 words, tables & fig.).

1933 **385 .1 (06 (.73)**
ilway Age, No. 7, February 18, p. 247.
National Transportation Committee makes compre-nsive **report.** (4 800 words.)

1933 **385. (061.4**
ilway Age, No. 7, February 18, p. 251.
How the railways have **increased their efficiency by operation.** (4 000 words & fig.)

Railway Engineer. (London.)

1933 **621 .133 (01**
ilway Engineer, February, p. 35.
LENTZ (H.). — **Higher steam temperatures for loco-otives.** (1 900 words & fig.)

1933 **656 .253 (.42)**
Railway Engineer, February, p. 39.
Speed signalling at Mirfield, London Midland and Scottish Ry. (3 900 words & fig.)

1933 **621 .33**
Railway Engineer, February, p. 46.
CROFT (E. H.). — **Electric train movement and energy consumption.** (2 900 words & fig.)

1933 **621 .134.3 (.42)**
Railway Engineer, February, p. 51.
The **Holmes poppet valve gear.** (1 300 words & fig.)

1933 **625 .252**
Railway Engineer, February, p. 53.
Ingenious **brake block centring devices.** (900 words & fig.)

1933 **621 .335 (.45)**
Railway Engineer, February, p. 54.
Italian **accumulator railcars.** (1 200 words.)

1933 **625 .156 (.42)**
Railway Engineer, February, p. 57.
Long stroke **hydraulic tension buffer stop.** (800 words & fig.)

1933 **621 .94 (.42)**
Railway Engineer, February, p. 58.
A new **capstan lathe.** (1 400 words & fig.)

Railway Engineering and Maintenance. (New York.)

1933 **385. (072 (.73) & 625 .14 (.73)**
Railway Engineering and Maintenance, January, p. 14.
Finding out what's what on the Pennsylvania **(Research work. — Track maintenance).** (4 900 words & fig.)

1933 **725 .33**
Railway Engineering and Maintenance, January, p. 20.
It pays to keep tab on the **water supply.** (2 700 words & fig.)

1933 **624 .1 & 627**
Railway Engineering and Maintenance, January, p. 23.
What a diver does on a railway **(subaqueous inspection work).** (2 200 words & fig.)

1933 **621 .33**
Railway Engineering and Maintenance, January, p. 27.
Electrification and the maintenance department. (1 700 words & fig.)

1933 **625 .143.3 (.73) & 665 .882 (.73)**
Railway Engineering and Maintenance, January, p. 66.
Extending life of rail by gas welding. (2 000 words & fig.)

1933 **625 .15 (.73) & 665 .882 (.73)**
Railway Engineering and Maintenance, January, p. 68.
Manganese trackwork can be repaired by welding. (4 300 words & fig.)

1933 621 .392 (.73) & 625 .143.3 (.73)
Railway Engineering and Maintenance, February, p. 74.
Building up rail ends with the electric arc. (3 700 words & fig.)

1933 621 .392 (.73) & 625 .143.4 (.73)
Railway Engineering and Maintenance, February, p. 77.
Can angle bars be built up ? (5 400 words & fig.)

1933 621 .392 (.73) & 624 (.73)
Railway Engineering and Maintenance, February, p. 80.
FISH (G. D.). — **Structures** offer new field for **arc welding.** (2 400 words & fig.)

1933 621 .392 (.73) & 625 .143.4 (.73)
Railway Engineering and Maintenance, February, p. 85.
Welded joints improve tunnel track conditions. (2 000 words & fig.)

Railway Gazette. (London.)

1933 385. (09 (.42)
Railway Gazette, No. 3, January 20, p. 73.
Centenary of the inception of the organisation which became the **Great Western Railway.** (2 200 words & fig.)

1933 656 .253 (.91)
Railway Gazette, No. 3, January 20, p. 77.
Power signalling at Singapore, Federated Malay States Railways. (900 words & fig.)

1933 656 .259 (.42)
Railway Gazette, No. 3, January 20, p. 78.
The Cooke **fog penetrating lamp.** (500 words & fig.)

1933 627
Railway Gazette, No. 3, January 20, p. 79.
The extension of Southampton **Docks,** Southern Ry. (3 000 words & fig.)

1933 625 .153 (.42)
Railway Gazette, No. 3, January 20, p. 109.
Switch diamonds and **spring crossings.** (600 words & fig.)

1933 385. (074 (.62)
Railway Gazette, No. 3, January 20, p. 113.
The Cairo **railway museum.** (900 words & fig.)

1933 621 .43 (.42)
Railway Gazette, January 27, Diesel railway traction supplement, p. 2.
HYDE TRUTCH (C. J.). — The future prospects of **Diesel traction in Great Britain.** (2 600 words & fig.)

1933 621 .335 & 621 .43
Railway Gazette, January 27, Diesel railway traction supplement, p. 6.
High-power **Diesel locomotives** for express and goods trains. (5 200 words & fig.)

1933 621 .
Railway Gazette, January 27, Diesel railway tracti
supplement, p. 13.
MIALL (S.). — A Dutch railway application of t
Vulcan-Sinclair **hydraulic coupling.** (1 500 words & fi

1933 621 .
Railway Gazette, January 27, Diesel railway tracti
supplement, p. 16.
MIALL (S.). — **Transmission and the rail Die engine.** (2 300 words.)

1933 621 .335 (.489) & 621 .43 (.48
Railway Gazette, January 27, Diesel railway tracti
supplement, p. 18.
Diesel-electric railcars for Danish railways. (1 3
words & fig.)

1933 621 .43 (.4
Railway Gazette, January 27, Diesel railway tracti
supplement, p. 23.
Diesel traction on the German Railways. (1 200 wor
& fig.)

1933 625 .
Railway Gazette, No. 5, February 3, p. 140.
Shock and sound-absorbing permanent way. (
words & fig.)

1933 621 .132.8 (.48
Railway Gazette, No. 5, February 3, p. 141.
A new **non-condensing turbine locomotive.** (1 0
words & fig.)

1933 656 .253 (.8
Railway Gazette, No. 5, February 3, p. 143.
Colour-light signalling at Montevideo. (1 000 wor
& fig.)

1933 621 .43 (.72
Railway Gazette, No. 6, February 10, p. 171.
New **petrol-driven locomotives** for the Bermuda Is
(2 600 words & fig.)

1933 621 .132.3 (.4
Railway Gazette, No. 6, February 10, p. 181.
New German 4-6-2 **high-pressure four-cylinder co pound express locomotives.** (350 words & fig.)

1933 624 .1 (.7
Railway Gazette, No. 7, February 17, p. 208.
The new Lower Zambesi **bridge.** (1 000 words & fi

1933 656 .215 (.4
Railway Gazette, No. 7, February 17, p. 212.
The **lighting of night works.** (2 000 words & fig.)

Railway Magazine. (London.)

1933 621 .33 (.4
Railway Magazine, February, p. 79.
Britain's first **main-line electrification.** (4 000 wor
& fig.)

1933 621 .132.5 (.43)
ailway Magazine, February, p. 105.
Prince Richard of HESSE. — Modern **goods locomo-ves** in Germany. (2 300 words & fig.)

Railway Mechanical Engineer. (Philadelphia.)

1933 313 : 656 .284 (.73) & 621 .118 (.73)
ailway Mechanical Engineer, January, p. 1.
Annual **report** of Bureau of **Locomotive Inspection.** 00 words & fig.)

1933 621 .43 (.73)
ailway Mechanical Engineer, January, p. 4.
Second **stainless-steel car with pneumatic tires.** 900 words & fig.)

1933 621 .135.2 (.73)
ailway Mechanical Engineer, January, p. 7.
Double-disc driving wheel. (600 words & fig.)

1933 621 .134.2
ailway Mechanical Engineer, January, p. 9.
SMITH (W.). — Modern **locomotive valves and valve ears** analyzed. Part I. (To be continued.) (5 000 words fig.)

1933 621 .135.2 (.73)
ailway Mechanical Engineer, January, p. 13.
Pneumatic lubricator for engine-truck journals. (700 ords & fig.)

1933 621 .138
ailway Mechanical Engineer, February, p. 39.
RICHARDSON (L.). — **Graphical analyses of me-anical operations.** (2 500 words & fig.)

1933 621 .134.2
ailway Mechanical Engineer, February, p. 45.
SMITH (W.). — Modern **locomotive valves and valve ars** analyzed. Part II. (To be continued.) (3 200 ords & fig.)

1933 621 .135.3 (.73)
ailway Mechanical Engineer, February, p. 50.
Interlocking spring rigging developed on the Texas d Pacific. (1 300 words & fig.)

1933 621 .133.1 & 621 .133.5
ailway Mechanical Engineer, February, p. 53.
SCHELLENS (E. L.). — **Relation between draft and aporation.** (1 500 words & fig.)

Railway Signaling. (Chicago.)

1933 313 : 656 .25 (.73)
ailway Signaling, January, p. 1.
Signaling construction during 1932. (1 800 words & bles.)

1933 656 .254 (.43)
ilway Signaling, January, p. 5.
New train-stop system developed in Germany. (600 rds & fig.)

1933 656 .257 (.73)
Railway Signaling, January, p. 6.
Simplified interlocking installed at the Dayton Terminal. (3 900 words & fig.)

1933 656 .253 (.73)
Railway Signaling, January, p. 11.
The St. Louis-San Francisco uses semaphores with **color-light indication on primary battery supply.** (1 100 words & fig.)

1933 656 .258 (.73)
Railway Signaling, January, p. 15.
Automatic interlocking in train-control territory. (1 300 words & fig.)

1933 656 .258 (.73)
Railway Signaling, February, p. 29.
Consolidated interlockings save the Chicago, Milwaukee, St. Paul and Pacific $ 10 730 net annually on an investment of $ 27 185. (1 700 words & fig.)

1933 625 .151 (.73)
Railway Signaling, February, p. 32.
How should **remote power switches** be braced. (3 400 words & fig.)

1933 656 .259 (.73)
Railway Signaling, February, p. 37.
Canadian Pacific installs **signaling for tunnel.** (1 500 words & fig.)

Transit Journal. (New York.)

1933 385 .11 (.73) & 625 .62 (.73)
Transit Journal, January, p. 13.
Track activity continues... Car purchases decline. (1 800 words & tables.)

1933 347 .763 (.73) & 656 .1 (.73)
Transit Journal, February, p. 47.
New bus rules prescribed for New York State. (800 words.)

1933 656 .1 (.73)
Transit Journal, February, p. 50.
SIMPSON (H. S.). — **Urban use of private automobiles** becoming stabilized. (2 500 words & fig.)

1933 621 .392 (.73) & 625 .143.4 (.73)
Transit Journal, January, p. 54.
SPRARAGEN (W.). — **Track welding practice** shows marked advance. (2 400 words & fig.)

University of Illinois Bulletin. (Urbana, Ill., U. S. A.)

1932 62. (01 & 656 .25
University of Illinois Bulletin, No. 88, July 1, p. 1.
KING (E. E.). — A test of the **durability of signal-relay contacts.** (2 800 words & fig.)

1932 **62. (01 & 721 .2**
University of Illinois Bulletin, No. 89, July 5, p. 1.
RICHART (F. E.), MOORMAN (R. B. B.) and WOODWORTH (P. M.). — **Strength and stability of concrete masonry walls.** (9 000 words, 8 tables & fig.)

In Spanish.

Ferrocarriles y Tranvias. (Madrid.)

1932 **621 .43**
Ferrocarriles y Tranvias, Diciembre, p. 380.
BASTOS (M.). — Grandes **locomotoras Diesel** para trenes rápidos y de carga. (5 400 palabras & fig.)

Gaceta de los Caminos de hierro. (Madrid.)

1933 **621 .43 (.43)**
Gaceta de los Caminos de hierro, n° 3695, 1° de Enero, p. 13.
Las nuevas **automotrices** de motor de combustión interna de los ferrocarriles del Reich. (1 400 palabras.)

Ingenieria y Construcción. (Madrid.)

1933 **621 .33**
Ingenieria y Construccion, Enero, p. 1.
GIBERT y SALINAS (A.). — Notas sobre **electrificaciones** ferroviarias. (10 400 palabras & fig.)

Revista de Obras Públicas. (Madrid.)

1933 **691 (.43) & 721 .9 (.43)**
Revista de Obras Públicas, n° 2, 15 de Enero, p. 29.
RIOS GARCIA (R.). — Las nuevas prescripciones alemanas para las **obras de hormigón.** (4 200 palabras & fig.)

1933 **624 .6**
Revista de Obras Públicas, n° 4, 15 de Febrero, p. 77.
CASADO (C. F.). — **Teoria del arco.** (4 700 palabras & fig.)

In Italian.

Annali dei lavori pubblici. (Roma.)

1932 **624 .2 (01**
Annali dei lavori pubblici, ottobre, p. 897.
TAGLIACOZZO (C.). — Contributo al **calcolo degli involucri elastici.** Tensioni in un involucro non resistente alla flessione (membrana) avente per superficie media un paraboloide di rotazione. (1 600 parole.)

La tecnica professionale. (Roma.)

1933 **625 .212 & 665 .885**
La tecnica professionale, gennaio, p. 8.
La **saldatura autogena** per ripristinare il profilo dei bordini consumati dei cerchioni. (3 600 parole & fig.)

1933 **625 .245 (.4) & 656 .225 (.**
La tecnica professionale, gennaio, p. 13.
DEL GUERRA (G.). — Verso un più largo svilup in Europa del traffico a mezzo delle « **Casse mobili** (containers). (2 800 parole & fig.)

L'Ingegnere. (Roma.)

1932 **624**
L'Ingegnere, dicembre, p. 875.
GUAITA (A.). — Il progetto analitico di un **por** **ad arco.** (5 500 parole & fig.)

1933 **656 .1 & 656**
L'Ingegnere, gennaio, p. 2.
VEZZANI (F.). — Fatti della **concorrenza** tra fer via, tranvia e automobile. (5 000 parole.)

1933 **6**
L'Ingegnere, gennaio, p. 7.
GIUSTI (A.). — Contributo allo studio delle **pro** **sui cementi.** (1 000 parole & fig.)

Rivista tecnica delle ferrovie italiane. (Roma.)

1933 **625 .1 (.4)**
Rivista tecnica delle ferrovie italiane, 15 gennaio, p.
OTTONE (G.). — La **ferrovia** Rovato-Soncino. (3 4 parole & fig.)

1932 **621 .138.5 (.45) & 725 .33 (.4**
Rivista tecnica delle ferrovie italiane, 15 gennaio, p.
ROMERO (R.). — Sistemazione degli **impianti trazione** di Milano. I nuovi depositi di Milano Centr e Smistamento. (6 500 parole & fig.)

In Dutch.

De Ingenieur. (Den Haag.)

1933 **656 (.49**
De Ingenieur, nr 2, 13 Januari, p. V. 1.
REITSMA (S. A.). — De **crisis** in het Nederlandsc **verkeerswezen.** (13 000 woorden & fig.)

1933 **625 .13 (.49**
De Ingenieur, nr 3, 20 Januari, p. B. 17.
THONET (F. P.). — De **tunnels** onder de Schel te Antwerpen. (4 700 woorden & fig.)

1933 **656 (.49**
De Ingenieur, nr 3, 20 Januari, p. V. 13.
De **crisis** in het Nederlandsche Verkeerswezen. (19 woorden & fig.)

1933 624 .2
Ingenieur, nr 7, 17 Februari, p. B. 31.
BIJLAARD. — **Knikzekerheid** van door koppelplaten verbonden profielen. (3 600 woorden & fig.)

Spoor- en Tramwegen. (Utrecht.)

1933 656 (.492)
Spoor- en Tramwegen, nr 2, 17 Januari, p. 35; nr 3, 31 Januari, p. 69; nr 4, 14 Februari, p. 93.
De weg naar **coördinatie** in het verkeerswezen in Nederland. (10 000 woorden & fig.) (Wordt vervolgd.)

1933 656 .223.2 (.492
Spoor- en Tramwegen, nr 3, 31 Januari, p. 59.
VERSPYCK (A. J. M.). — De **wagenverdeeling** der Nederlandsche Spoorwegen in nieuwe banen. (2 800 woorden & fig.)

1933 656 .212.5
Spoor- en Tramwegen, nr 3, 31 Januari, p. 63; nr 4, 14 Februari, p. 90.
BRUYN (G. Th.). — **Rangeerterreinen** voor goederentreinen. (5 600 woorden & fig.)

1933 621 .43 (.43) & 656 .222.5 (.43)
Spoor- en Tramwegen, nr 4, 14 Februari, p. 87.
Sneller reizigersvervoer en het gebruik van motortuigen bij de Deutsche Reichsbahn Gesellschaft. (3 000 woorden.)

In Czech.
(= 91.886)

Zprávy železničních inženýrů. (Prague.)

1932 656 .22 = 91 .886
Zpravy zeleznicnich inzenyru, n° 12, p. 217.
SCHMID. — Modern principles for drawing up time tables from the point of view of the choice of the transportation units (heavy trains, light trains, rail motor cars, etc.). (3 300 words & diagr.)

1932 621 .43 = 91 .886
Zpravy zeleznicnich inzenyru, n° 12, p. 222.
VAJNA. — **Fuel consumption** of Diesel engines. (2 200 words.)

In Polish.
(= 91.885)

Inżynier Kolejowy. (Warsaw.)

1932 656 .232 = 91 .885
Inzynier Kolejowy, No. 12, p. 257.
DOBRZYCKI. — The **cost price** of passenger traffic. (10 400 words & diagr.)

1932 656 .284 = 91 .885
Inzynier Kolejowy, No. 12, p. 265.
PANCER. — Cases of **axle breakages** and their causes. (5 200 words & fig.)

1932 656 .27 (.438) = 91 .885
Inzynier Kolejowy, No. 12, p. 269.
DOBIECKI. — The **economic condition of the narrow** gauge lines of the Polish State Railway System. (2 600 words.)

1932 621 .43 (.438) = 91 .885
Inzynier Kolejowy, No. 12, p. 276.
Pneumatic-tyred rail car of the Austro-Daimler system (tested on the Polish State Railways in January 1933. (3 250 words & fig.)

In Portuguese

Boletim do Instituto de Engenharia (S. Paulo). (Brasil.)

1933 313 .385 (.81)
Boletim do Instituto de Engenharia, Janeiro, p. 88.
ARAUJO CORREA DE BRITO (P.). — **Estatistica ferroviaria** do Estado de S. Paulo. (6 600 palavras & 14 quadros.)

Gazeta dos Caminhos de ferro. (Lisboa.)

1933 725 .31 (.469)
Gazeta dos caminhos de ferro, n° 1083, 1 de fevereiro, p. 81.
Na construçao da **nova estação** da Companhia dos Caminhos de ferro do Norte de Portugal vão ser empregados materiaes e mão de obra portugueses. (1 600 palavras & fig.)

1933 621 .335 (.469)
Gazeta dos caminhos de ferro, n° 1084, 16 de fevereiro, p. 111.
As **automotoras electricas** do caminho de ferro de Estella a Victoria. (3 200 palavras & fig.)

In Serbian.
(= 91.882)

Saobraćajni pregled. (Belgrad.)

1932 385 .15 (.497.1) = 91 .882
Saobracajni pregled, No. 11, p. 489.
VAGNER. — The question of the **railways worked by the State or by private undertakings.** (2 250 words.)

1932 656 .25 (0 = 91 .882
Saobracajni pregled, No. 11, p. 496.
RJEPIC. — **Railway signalling.** (3 600 words.)

1932 **656 .211.5 = 91 .882**
Saobracajni pregled, No. 11, p. 504.

VEJC. — Fixing the number of **platform tracks** in large railway terminals. (2 700 words & fig.)

1932 **351 .81 (.497.1) = 91 .882**
Saobracajni pregled, No. 11, p. 515.

STOJNIDZ. — Adaptation of the Jugoslav Railways to the prescriptions of the **new law** (1930) **on public means of communications.** (6 300 words.)

1932 **385 .524 = 91 .882**
Saobracajni pregled, No. 12, p. 539.

SVAGEL. — The **premium problem,** particularly output premiums in railway workshop and premiums f savings in fuel and lubricants. (9 900 words.)

1932 **621 .13 (0 = 91 .8**
Saobracajni pregled, No. 12, p. 564.

ILIC. — The **rational utilisation of locomotive durin** normal and reduced traffic periods. (1 800 words.)

1933 **385 .581 (.497.1) = 91 .8**
Saobracajni pregled, No. 12, p. 575.

DRUSKOVIC. — **Work timing and recording** in t repair shops of the Jugoslav State Rys. (4 500 words

14.324. — M. Weissenbruch Co., Ltd., Printer of the King, 49, rue du Poinçon, Bruxelles.

MONTHLY BIBLIOGRAPHY OF RAILWAYS (1).

PUBLISHED UNDER THE SUPERVISION OF

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General Secretary of the Permanent Commission of the International Railway Congress Association.

JUNY (1933)

[016 .385. (02]

I. — BOOKS.

In French.

1932 313 .385 (.438)

Annuaire statistique des chemins de fer de l'Etat olonais pour l'année 1931.

Varsovie, Ministère des Communications. Un volume, 76 pages.

1933 385. (09.1

Carte des chemins de fer.

Paris, Secrétariat Général de l'Union internationale es chemins de fer, 10, rue de Prony, et Barrère, 1, rue du Bac. (Prix : 140 francs français.)

1933 69. (02

HAMPLY (R.).

Nouvelle encyclopédie pratique des constructeurs nécaniciens, chaudronniers, électriciens.

Paris, Librairie Polytechnique, Ch. Béranger et iège, 1, quai de la Grande-Bretagne. 20 volumes. Prix : 20 volumes, 340 francs français. Par volume : 8 francs français.)

1933 531 & 625 .213

ONSTANTIN (C.).

Véhicules roulants de chemin de fer. Théorie mécaique du mouvement oscillatoire des ressorts.

Bruxelles, A. Bieleveld, 66, rue Montagne-aux-Herbes-Potagères. Un volume (16 × 24 cm.), 78 pages t 18 figures.

1933 656 .2

ONTY (H.).

L'exploitation des chemins de fer.

Paris, Génie Civil, 5, rue Jules Lefebvre. Une brohure, 46 pages.

1933 624 .92

ABARRAQUE.

Manuel de la charpente en fer.

Paris (6e), J. B. Baillière & Fils, rue Hautefeuille, 19. Un volume (11.5 × 16 cm.), 402 pages et figures. Prix : 28 francs français.)

1933 691 (02

MARCOTTE (E.).

Les matériaux des constructions civiles et des travaux publics. Tome IV : Béton armé, bois, peintures et vernis. Routes en béton.

Paris (VIe), Gauthier-Villars, 55, quai des Grands Augustins. Un volume (14 × 23 cm.), 484 pages et 251 figures. (Prix : 100 francs français.)

1933 722

NACHTERGAL (A.).

Le traceur en constructions métalliques.

Paris, Ch. Béranger, 15, rue des Saints-Pères. Un volume (16 × 25 cm.), 166 pages et 182 figures. (Prix : 25 francs français.)

1933 625 .2 (.44) & 625 .4 (.44)

NICOLAS-CHARLES (P.).

Le matériel roulant du chemin de fer métropolitain de Paris.

Paris (Ve), Léon Eyrolles, 3, rue Thénard. Un volume (16.5 × 25 cm.), 97 pages, 51 figures. (Prix : 14 francs français.)

1933 385 .113 (.44)

Rapports du Conseil d'Administration et de la Commission de vérification des comptes de la Compagnie du P. O.

Paris, Compagnie du chemin de fer de Paris à Orléans. Un volume, 97 pages et tableaux.

1933 385 .113 (.494)

Rapport du Conseil d'Administration et de la Direction Générale des Chemins de fer fédéraux suisses sur la situation financière de cette entreprise et les mesures à prendre pour son rétablissement. (7 février 1933.)

Berne, Direction Générale des Chemins de fer Fédéraux suisses. Un volume, 110 pages.

1932 313 .656.225 (.438)

Résumé général du tonnage des marchandises transportées par les chemins de fer de l'Etat polonais pour l'année d'exercice 1931.

Varsovie, Bureau statistique central des transports des P. K. P. Un volume, 245 pages.

(1) The numbers placed over the title of each book are those of the decimal classification proposed by the Railway Congress conjointly with the Office Bibliographique International, of Brussels. (See « Bibliographical Decimal Classification as applied to Railway Science », by L. Weissenbruch, in the number for November 1897, of the *Bulletin of the International Railway Congress*, p. 1509).

1933 313 .385 (.494)
Statistique des chemins de fer suisses, 1931.
Berne, Département fédéral des chemins de fer. Un volume (22 × 35 cm.), 248 pages. (Prix : 10 francs suisses.)

1933 313 .385
Statistique internationale des chemins de fer, année 1931, publiée par le Secrétariat Général de l'U. I. C.
Paris (XVII^e^), Secrétariat de l'Union Internationale des Chemins de fer, 10, rue de Prony. Un volume (24 × 31.5 cm.). (Prix : 50 francs français.)

1933 625 .4 (.44)
VIRGITTE (J.).
Les installations du chemin de fer métropolitain de Paris.
Paris (V^e^), Léon Eyrolles, 3, rue Thénard. Un volume (16.5 × .25 cm.), 154 pages, 134 figures et 4 planches. (Prix : 40 francs français.)

1933 621 .133.3
WEBER (A.).
La locomotive à surchauffe.
Bruxelles, Imprimerie F. Van Buggenhoudt. Un volume (16 × 24 cm.), 450 pages. (Prix : 125 francs belges.)

In German.

1933 385 .113 (.494)
Bericht des Verwaltungsrates und der Generaldirektion der Schweizerischen Bundesbahnen über die Finanzlage der Bundesbahnen und die zu ihrer Sanierung zu ergreifenden Massnahmen. (7. Februar 1933.)
Bern, Generaldirektion der Schweizerischen Bundesbahnen. 1 Band, 110 Seiten.

1933 691
EMPERGER (F.).
Handbuch für Eisenbahn.
Berlin, Wilhelm Ernst & Sohn. 1 Band, 80 Seiten und Abbildungen. (Preis : 5.50 R.M.)

1933 721 .9
HENKEL (O.).
Grundzüge des Stahlbaues.
Leipzig, Johann Ambrosius Barth & Brüssel, Falk, Fils, 22, rue des Paroissiens. 1 Band, 254 Seiten und 557 Abbildungen. (Preis : 8.40 R.M.)

1933 01
NEIMANN (W. B.).
Dezimalklassifikation und Weltsprache. Eine kritische Betrachtung.
Berlin-Charlottenburg, Robert Kiepert. (Preis : 2.25 R.M.)

1933 62. (01 & 721 .9
OLSEN.
Uber den Sicherheitsgrad von hochbeanspruchten Eisenbetonkonstruktionen.
Berlin, Wilhelm Ernst & Sohn. 1 Band. 143 Seiten, 34 Abbildungen und 32 Zahlentafeln. (Preis : 15 R.M.)

1933 621 .1
PRAETORIUS (E.).
Billige Kessel, billiger Dampf.
Berlin. Verkehrswissenschaftliche Lehrmittelgese-schaft m. b. H. bei der Deutschen Reichsbahn u V. D. I. Verlag. 1 Band, 155 Seiten, 43 Abbildung (Preis : 3.50 R.M.)

1933 721
SCHAPER (G.).
Grundlagen des Stahlbaues.
Berlin, Wilhelm Ernst & Sohn. 1 Band, 287 Seit und 421 Abbildungen. (Preis : 23.50 R.M.)

1933 6
VETTER (H.) und RISSEL (E.).
Materialauswahl für Betonbauten unter besonde Berücksichtigung der Wasserdurchlässigkeit.
Leipzig, Johann Ambrosius Barth und Brüssel, Fa Fils, 22, rue des Paroissiens. 1 Band, 94 Seit 40 Textabbildungen und 16 Zusammenstellung (Preis : 4.50 R.M.)

1932 385 .
WITTE (B.).
Eisenbahn und Staat.
Iena, Gustav Fischer. 1 Band, 272 Seiten und 12 Ta-bellen.

1933 62. (
ZILLICH (K.).
Statik.
Berlin, Wilhelm Ernst & Sohn. 1 Band, 160 Seit und 104 Abbildungen. (Preis : 3.40 R.M.)

In English.

1933 624. (
ABRAHAMS (F. H.), A. M. T. Struc. E.
The design of steel bridges.
London, The Draughtsman Publishing Company, L (Price : 15 sh. net.)

1933 656 .25 (06 (.7
AMERICAN RAILWAY ASSOCIATION. Signal S tion.
Proceedings, Annual meeting held in Chicago May 1932.
New York City. R. H. C. Balliet, secreta 30, Vesey Street. Vol. XXIX, 508 pages (6 1/4 × 9 3 inches). (Price : $ 8.00.)

1933 656 .25 (06 (.7
AMERICAN RAILWAY ASSOCIATION. Signal S tion.
Proceedings thirty-ninth annual meeting, New Yo May 9 and 10, 1933. Advance notice.
New York. Published by the Association, 30, Ves Street. 335 pages.

1933 656 .25 (0 (.73) & 656 .25 (06 (.73)

MERICAN RAILWAY ASSOCIATION. Signal Section.

American Railway signaling principles and pracces. Chapter XIV : Definitions.

New York. Published by the Association, 30, Vesey reet. 81 pages. (Price : 35 cents — 25 cents for embers and railroad employees.)

1933 656 .25 (06 (.73) & 656 .257 (.73)

MERICAN RAILWAY ASSOCIATION. Signal Section.

American railway signaling principles and practices. hapter XVII : Mechanical and electro-mechanical terlocking.

New York. Published by the Association, 30, Vesey reet, 69 pages. (Price : 35 cents — 25 cents for embers and railroad employees.)

1933 656 .25 (06 (.73) & 656 .257 (.73)

MERICAN RAILWAY ASSOCIATION. Signal Section.

American railway signaling principles and practices. hapter XX : Interlocking circuits.

New York. Published by the Association, 30, Vesey reet, 148 pages. (Price : 45 cents — 35 cents for embers and railroad employees.)

1933 625 .2 (06 (.73)

MERICAN RAILWAY ENGINEERING ASSOCIATION.

Program thirty-fourth annual convention and Year ook. Numerical list of members. Alphabetical list members.

Chicago, Ill. Published by the Association, 59, East an Buren Street. 120 pages. Bull. No. 335.

1932 625 .2 (06 (.73)

Car builders' cyclopedia of American practice. Comled and edited for the American Railway Association, Mechanical Division.

New York. Simmons-Boardman Publishing Co.) × 12 inches), 1 260 pages, illust., diagr., charts, bles. (Price : $ 5.00.)

1933 621 .392

AVIS (A. F.).

Designing for arc welding. Second Lincoln electric elding prize papers.

Cleveland, Ohio (U. S. A.). Published by the Linln Electric Co. (6 × 9 inches), 415 pages, photogr., ne drawings and tables. (Price : $ 2.50.)

1933 621 .89

VANS (E. A.).

Lubricating and allied oils.

London. Chapman and Hall. 2nd edition, revised ıd enlarged. 175 pages. (Price : 9 sh. 6 d. net.)

1933 621 .392 & 721 .9

ISH (Gilbert D.).

Arc-welded steel-frame structures.

New York and London. Published by McGrawill Book Co., Inc. (6 × 9 inches), 401 pages, photogr., bles and line drawings. (Price : $ 5.00.)

1933 62. (01

GREAVES (R. H.), D. Sc. and **WRIGHTON (H.),** B. Met.

Practical microscopical metallography.

London, W. C. 2. Chapman and Hall, Ltd. 11, Henrietta-street. (Price : 18 sh. net.)

1933 621 .131.2 (.71)

GREEN (J. J.).

The wind tunnel development of a proposed external form for steam locomotives.

Ottawa (Canada). Reprinted from the Canadian Journal of Research. 61 pages, illust.

1933 621 .392 (02

Handbook for electric welders.

London, E. 17. Murex Welding Processes, Ltd., Ferry Lane Works, Forest-row. (Price : 2 sh. 6 d. net.)

1933 621 .392 (02

HUBERT (E. H.).

Manual of electric arc welding.

London. McGraw-Hill Publishing Company, Ltd. (Price : 12 sh. net.)

1932 621 .43

JUDGE (A. W.).

Testing of high speed internal combustion engines.

New York. D. Van Nostrand Co. Second edition (6 × 9 inches), 459 pages, illust., diagr., charts and tables. (Price : $ 5.00.)

1933 38 (.73) & 656 (.73)

MOULTON (Harold G.).

The American transportation problem.

Washington, D. C. Published by the Brookings Institution. (5 × 8 inches), 915 pages, photographs, line drawings and tables. (Price : $ 3.00.)

1933 336 .2 (.73) & 656 .1 (.73)

The taxation of motor vehicle transportation.

New York. Published by the National Industrial Conference Board. (6 × 9 inches), 196 pages. (Price : $ 2.50.)

1933 621 .13 (02 (.42)

The Locomotive Engineer's Pocket Book, 1933.

London E. C. 4, The Locomotive Publishing Co., Ltd., 3, Amen Corner, Paternoster Row. 1 vol. (6 1/2 × 3 1/2 inches) of 390 pages, with numerous illustrations, diagrams and tables. (Price, clothbound : 3 sh. 6 d.)

1933 693

SINGLETON-GREEN (J.), M. Sc., A. M. I. Mech. E., M. I. Struct. E., M. Am. C. J., M. I. G.

Concrete engineering. Vol. I : Practical concrete.

London. Charles Griffin and Co. Ltd. (Price : 8 sh.)

1932 621 .133.1

SPIERS (H. M.).

Technical data on fuel.

London. British National Committee of the World Power Conference. (Price : 12 sh. 6d.). (Obtainable from American Committee, World Power Conference, 1419, Chrysler Building, New York, $2.75.) (5 × 8 inches), 302 pages, diagr., charts & tables.

In Spanish.

1933 385. (06 .1

REPARAZ (D. F.).

El Congreso de ferrocarriles de El Cairo.

Madrid, Asociación General de Transportes por v[ía] férrea. 1 volume, 45 paginas.

[016 .385 (05]

II. — PERIODICALS.

In French.

Annales des ponts et chaussées. (Paris.)

1933 624 .5 (.44)

Annales des ponts et chaussées, partie technique, janvier-février, p. 79.

COQUAND (R.). — Les épreuves du **pont suspendu** du Guétin. (5 800 mots & fig.)

1933 691

Annales des ponts et chaussées, partie technique, janvier-février, p. 102.

DUMAS (F.). — Le **béton armé** et ses hypothèses. (18 000 mots & fig.)

Arts et Métiers. (Paris.)

1933 62. (01

Arts et Métiers, mars, p. 76.

MARCOTTE (E.). — **Elasticité dynamique.** Enregistrement d'oscillations, de vibrations et de déformations mécaniques quelconques. (5 000 mots & fig.)

1933 625 .13 (.44)

Arts et Métiers, mars, p. 83.

FRÉDET (E.). — Le renforcement du **viaduc** d'Orival. (1 600 mots & fig.)

Bulletin de la Société des ingénieurs civils de France. (Paris.)

1932 669 .1

Bull. de la Soc. des ing. civ. de France, juillet-août, p. 991.

PERRIN (R.). — Progrès dans la **métallurgie de l'acier.** (2 700 mots.)

1933 656 .1 & 656 .2

Bull. de la Soc. des ing. civ. de France, n° 4, P. V. Séance du 24 février, p. 106.

DUPUIS (M. D.). — **Le rail et la route.** Etat de la question et études faites par les grands réseaux; solutions adoptées à l'étranger; solutions proposées par les grands réseaux. (10 300 mots.)

1933 621 .13[...]

Bull. de la Soc. des ing. civ. de France, n° 5, P. [V.] Séance du 10 mars, p. 144.

VALENZIANI (H.). — Un nouveau type de **lo[co]motive à vapeur articulée** à grande puissance, systè[me] Franco. (4 000 mots.)

Bulletin de l'Union internationale des chemins de fer. (Paris.)

1933 347 [...]

Bull. de l'Union intern. des ch. de fer, février, p. [...]

SPIESS (W.). — De la **négociabilité des titres** [de] transport par chemins de fer et de la possibilité [de] leur conférer la qualité d'être transmissibles com[me] les lettres de change. (6 300 mots.) (A suivre.)

1933 385 .113 (.4[...]

Bull. de l'Union intern. des ch. de fer, février, p. [...]

Les **chemins de fer** exploités par l'Etat français [en] 1931. (10 800 mots.)

1933 656 .[...]

Bull. de l'Union intern. des ch. de fer, février, p. [...] mars, p. 92.

Les **grandes relations** par chemins de fer. (17 [...] mots.)

1933 385. (0[...]

Bull. de l'Union intern. des ch. de fer, mars, p. 104. [...]

Activité en 1932, des principaux **organismes int[er]nationaux de chemins de fer** autres que l'U. I. [...] (4 400 mots.) (A suivre.)

Bulletin de l'Union internationale de tramwa[ys,] de chemins de fer d'intérêt local et de tra[ns]ports publics automobiles. (Bruxelles.)

1933 6[...]

Bull. de l'Union intern. de Tramw., de Ch. de fer d'i[nt.] loc. et de Transp. publics autom., mars, p. 4.

WOLFF (C.). — Rapport sur les recherches relativ[es] à la **corrosion.** (6 600 mots, 1 tableau & fig.)

Bulletin des transports internationaux par chemins de fer. (Berne.)

1933 **656 .237.7**
ıll. des transp. intern. par ch. de fer, mars, p. 91.
NOÉ (G.). — A propos du **dédouanement des bagages** s voyageurs en transit international. (2 300 mots.)

1933 **313 .385 (.47.42)**
ıll. des transp. intern.par ch. de fer, mars, p. 124.
Statistique des chemins de fer de l'Etat d'Estonie ur l'exercice 1931-1932. (300 mots.)

Bulletin technique de la Suisse romande. (Vevey.)

1933 **621 .43**
ıll. techn. de la Suisse romande, n° 5, 4 mars, p. 53; n° 7, 1er avril, p. 81.
Locomotives Diesel-Sulzer de grande puissance pour ains rapides et trains de marchandises. (3 700 mots fig.)

1933 **385 (.494) & 656 .1**
ıll. techn. de la Suisse romande, n° 5, 4 mars, p. 56.
SAYOUS (A. E.). — La **crise** des Chemins de fer ́déraux et la **concurrence** de la route en Suisse. 500 mots.)

ılletin technique de l'Union professionnelle des Inspecteurs techniques et des chefs de section des chemins de fer belges. (Bruxelles.)

1933 **625 .143.5**
ıll. techn. de l'Union profes. des Inspecteurs techn. et des Chefs de section des ch. de fer belges, n° 51, 15 avril, p. 20.
TAK (A.). — La fixation des **plaques d'appui** sur s traverses en sapin dans la voie hollandaise N. P. 46. 500 mots & fig.)

Chronique des transports. (Paris.)

1933 **656 .1 (.460) & 656 .2 (.460)**
ıronique des transports, n° 5, 10 mars, p. 8.
La **coordination** du rail et de la route en Espagne. 500 mots.)

1933 **385 .581 (.44) & 385 .587 (.44)**
ıronique des transports, n° 6, 25 mars, p. 4.
La semaine de 40 heures et la **rationalisation** dans chemins de fer français. (5 500 mots.)

1933 **625 .245 & 656 .225**
ıronique des transports, n° 7, 10 avril, p. 19.
Le rail et la route. (1 800 mots.)

Génie civil. (Paris.)

1933 **621 .132.5 (.44)**
Génie civil, n° 2638, 4 mars, p. 197.
MARTIN (H.). — La nouvelle **locomotive type « Mountain »**, des Chemins de fer de l'Etat français. (3 000 mots & fig.)

1933 **62. (01**
Génie civil, n° 2638, 4 mars, p. 213.
LE ROLLAND (P.) et SORIN (P.). — Nouvelle méthode de détermination des **modules d'élasticité.** (1 200 mots.)

1933 **656 .1 & 656 .2**
Génie civil, n° 2639, 11 mars, p. 231.
Le rail et la route. Les points de vue des grands réseaux français, des transporteurs automobiles et des usagers. (4 100 mots.)

1933 **669 .1**
Génie civil, n° 2639, 11 mars, p. 238.
La fabrication et les propriétés mécaniques des **aciers à ressorts.** (1 000 mots & fig.)

1933 **656 .258 (.498)**
Génie civil, n° 2640, 18 mars, p. 258.
Le **poste central à commande électrique** des aiguilles et signaux, de la gare du Nord, à Bucarest. (1 200 mots & fig.)

1933 **621 .9**
Génie civil, n° 2642, 1er avril, p. 300.
FÈVRE (L.). — **Presses à forger** hydrauliques de 10 000 tonnes. (3 000 mots & fig.)

1933 **621 .132.8 (.44) & 625 .175 (.44)**
Génie civil, n° 2642, 1er avril, p. 303.
DELANGHE (G.). — Les applications du **pneumatique** à la voie ferrée. Les motocyclettes-draisines, système Alcyon, pour route et pour voie ferrée. (3 700 mots & fig.)

1933 **621 .43 (.43)**
Génie civil, n° 2643, 8 avril, p. 317.
EFFERTZ (J.). — **Automotrice rapide,** à deux moteurs Diesel, des Chemins de fer allemands. (2 400 mots & fig.)

1933 **621 .131.1**
Génie civil, n° 2643, 8 avril, p. 329.
BUCHWALD (A.). — Détermination de la **vitesse maximum** des véhicules de chemins de fer munis de roues motrices. (1 000 mots & fig.)

1933 **531**
Génie civil, n° 2644, 15 avril, p. 345.
MYARD (F. E.). — Théorie générale des **joints de transmission de rotation** à couples d'emboîtement. (5 300 mots & fig.)

1933 **62. (01**
Génie civil, n° 2644, 15 avril, p. 349.
KLEIN (A.). — La résistance des **constructions** aux mouvements vibratoires. (3 800 mots & fig.)

L'Allègement dans les Transports. (Lucerne.)

1933 **625 .2 (0 & 669**
L'Allègement dans les Transports, mars-avril, p. 45.
DUBATH (H.). — Notice sur quelques automotrices et remorques construites avec utilisation de **métaux légers.** (1 100 mots & fig.)

La Science et la Vie. (Paris.)

1933 **625 .245**
La Science et la Vie, avril, p. 316.
Une **poche de coulée** géante pour le **transport de la fonte en fusion.** (400 mots & fig.)

La Traction électrique. (Paris.)

1932 **625 .5 (.494)**
La Traction électrique, novembre, p. 147.
FREY (W.). — Le **chemin de fer funiculaire** de Davos-Parsenn. (3 000 mots & fig.)

L'Equipement Rural. (Paris.)

1933 **656 .1 (.44) & 656 .2 (.44)**
L'Equipement rural, février, p. 25.
PIESSES (R.). — La **lutte entre le rail et la route** pour l'approvisionnement de Paris. (3 200 mots & fig.)

Les Chemins de fer et les Tramways. (Paris.)

1933 **621 .132.8 (.47)**
Les Chemins de fer et les Tramways, mars, p. 53.
SPIESS (E.). — **Locomotive articulée** des Chemins de fer de l'U. R. S. S., type 2-4-1 + 1-4-2. (6 400 mots & fig.)

1933 **621 .335**
Les Chemins de fer et les Tramways, mars, p. 57.
Transmission du couple moteur sur les locomotives électriques. (6 700 mots & fig.)

1933 **625 .143.5**
Les Chemins de fer et les Tramways, mars, p. 62.
DESCARDES (E.). — Note concernant le calcul et l'essai des **rondelles Grower.** (4 300 mots, 3 tableaux & fig.)

1933 **625 .212**
Les Chemins de fer et les Tramways, mars, p. 66.
Perfectionnements aux **roues à pneumatiques** pour **voies ferrées.** (1 800 mots & fig.)

1933 **625 .144**
Les Chemins de fer et les Tramways, mars, p. 67.
Dispositif pour la **pose mécanique** des voies ferrées. (1 800 mots & fig.)

1933 **625 .253 & 625 .255**
Les Chemins de fer et les Tramways, mars, p. 70.
A propos du **freinage par récupération** sur les chemins de fer électrifiés et du **freinage continu** à air comprimé. (2 500 mots.)

1933 **625 .17**
Les Chemins de fer et les Tramways, mars, p. 72.
VIÉ (G.). — Note sur deux nouveaux **appareils d'étude et d'auscultation des voies.** (2 900 mots & fig.)

1933 **656 .1 & 656 .**
Les Chemins de fer et les Tramways, avril, p. 77.
Le rail et la route. (3 600 mots.)

1933 **621 .3**
Les Chemins de fer et les Tramways, avril, p. 79.
VALAT (E.). — Les méthodes d'étude du **mouvement des trains électriques** et leur application à la prédétermination du matériel de traction électrique et à sa bonne utilisation en service. (8 000 mots.) (A suivre.)

1933 **621 .132.8 & 621 .4**
Les Chemins de fer et les Tramways, avril, p. 84.
SPIESS (E.). — **Locomotives Diesel** pour trains de voyageurs. (9 900 mots & fig.)

1933 **625 .21**
Les Chemins de fer et les Tramways, avril, p. 91.
DESGARDES (E.). — Note concernant le calcul de **ressorts en spirale.** (1 200 mots & fig.)

1933 **625 .21**
Les Chemins de fer et les Tramways, avril, p. 93.
Roue amortie S. O. M. U. A. (1 800 mots & fig.)

1933 **6**
Les Chemins de fer et les Tramways, avril, p. 95.
DUCHESNOY. — La **cimentation des terrains.** (4 00 mots & fig.)

1933 **621 .33**
Les Chemins de fer et les Tramways, avril, p. 98.
Appareil de protection contre l'emballement des essieux moteurs électriques. (1 300 mots & fig.)

L'Industrie des voies ferrées et des transports automobiles. (Paris.)

1933 **621 .335 (.44)**
L'Ind. des voies ferrées et des transp. autom., février, p. 52.
Automotrices électriques à accumulateurs. Réseau de la Haute-Garonne. (4 000 mots & fig.)

1933 **625 .245 & 656 .22**
L'Ind. des voies ferrées et des transp. autom., mars, p. 81.
SCHREURER. — Le « **Container** ». (5 600 mots & fig.)

Revue générale des chemins de fer. (Paris.)

1933 **621 .132.3 (.44**
Revue générale des chemins de fer, mars, p. 211.
DE CASO. — Les nouvelles **locomotives de banlieue** du chemin de fer du Nord. (3 900 mots & fig.)

1933 **656 .212.6 (.44)**
vue générale des chemins de fer, mars, p. 223.
DAVID (L. C.). — Essai d'amélioration de la **manu-ution P. V.** sur les quais de transbordement de la mpagnie d'Orléans. (5 800 mots & fig.)

1933 **625 .234 (.44)**
vue générale des chemins de fer, mars, p. 235.
ERB. — Etude sur la **régulation du chauffage** des ins. (5 000 mots & fig.)

1933 **656 .221 & 656 .222.5**
vue générale des chemins de fer, mars, p. 245.
Calcul des **temps de parcours** des trains. (4 600 mots fig.)

1933 **385 .113 (.48)**
vue générale des chemins de fer, mars, p. 254.
Résultats d'exploitation des réseaux scandinaves. 000 mots.)

1933 **624 .32 (.44)**
vue générale des chemins de fer, avril, p. 299.
CAMBOURNAC. — **Reconstruction du pont** du che-n de fer sur l'Oise, à Pontoise. (6 400 mots & fig.)

1933 **621 .134.2**
vue générale des chemins de fer, avril, p. 314.
MESTRE (H. C.). — **Distribution Walschaerts** pour omotive à vapeur, à simple expansion, forte pres-on (20 hpz.) et haute surchauffe (400°). (5 000 ots.)

1933 **625 .172 (.44) & 625 .245 (.44)**
vue générale des chemins de fer, avril, p. 322.
PLACE (P.). — Nouvelles **voitures dynamomètres** s réseaux français. (5 700 mots & fig.)

Revue politique et parlementaire. (Paris.)

1933 **658 .516**
vue politique et parlementaire, mars, p. 477.
GIRARDEAU (R.). — La **normalisation** : son objet, s limites. (7 500 mots.)

Revue universelle des Mines. (Liége.)

1933 **624 .92**
vue universelle des mines, n° 5, 1er mars, p. 117; n° 6, 15 mars, p. 146.
CAMPUS (F.). — La **charpente métallique** rivée et robée de l'Institut de chimie et de métallurgie de Université de Liége (au Val-Benoit). (15 500 mots fig.) (A suivre.)

1933 **621 .116**
vue universelle des mines, n° 6, 15 mars, p. 157.
RICHTER (H.). — Les **boues des chaudières**, un nger inconnu jusqu'à ce jour. (3 900 mots & fig.)

1933 **621 .99**
vue universelle des mines, n° 7, 1er avril, p. 183.
LEPERSONNE (O.). — Les **écrous auto-indesser-bles.** (5 300 mots & fig.)

1933 **624 .2**
Revue universelle des mines, n° 8, 15 avril, p. 201.
PERELMAN (J.). — **Calcul** économique des pièces métalliques soumises à la flexion composée. (4 300 mots & fig.) (A suivre.)

In German.

Die Lokomotive. (Wien).

1933 **621 .132.3 (.64)**
Die Lokomotive, März, S. 41.
1-D-1 Heissdampf-Personenzugs-Lokomotive der Marokkanischen Eisenbahngesellschaft. (2 800 Wörter & Abb.)

Elektrische Bahnen. (Berlin.)

1933 **621 .335 & 621 .392**
Elektrische Bahnen, Januar, S. 1.
REICHEL (W.). — **Elektrische Lokomotive** der Achsfolge Bo-Bo mit geschweissten Rahmen- und anderen neuartigen Bauteilen (Bauart Siemens-Schuckert.) (5 000 Wörter & Abb.)

1933 **621 .335 (.73)**
Elektrische Bahnen, Februar, S. 28; Januar, S. 10.
SACHS (K.) und BASTON (C. E.). — Neuere amerikanische **Einphasen-Gleichstrom-Umformerlokomotiven.** (5 300 Wörter & Abb.) (Schluss folgt.)

1933 **621 .332**
Elektrische Bahnen, Januar, S. 22.
HUG (A. M.). — Verringerung des Gewichtes von **Fahrleitungen.** (800 Wörter & Abb.)

1933 **621 .43**
Elektrische Bahnen, März, S. 58.
GELBER (F.). — **Elektrische Kraftübertragung** für Verbrennungsmotor-Fahrzeuge. (6 200 Wörter.)

1933 **621 .335**
Elektrische Bahnen, März, S. 64.
KOPCZYNSKI (Th.). — **Strom- und Spannungsverhältnisse** bei der Feinreglersteuerung für Lokomotiven nach der Bauart Maffei-Schwartzkopff (M. S. W.). (1 900 Wörter & Abb.)

Glasers Annalen. (Berlin.)

1933 **621 .116**
Glasers Annalen, Nr. 1337, 1. März, S. 36.
JULIUSBURGER (P.). — Über Wirtschaftlichkeit und Rentabilität von **Abdampfvorwärmer und Abdampfstrahlpumpe.** (4 800 Wörter & Abb.)

1933 **621 .116**
Glasers Annalen, Nr. 1337, 1. März, S. 41.
SCHNEIDER (L.). — Die mechanische Beanspruchung der Rohreinwalzstellen von **Heizrohrkesseln.** (3 300 Wörter & Abb.)

1933 **625 .245**
Glasers Annalen, Nr. 1338, 15. März, S. 45.
CAESAR. — Die **Fahrsicherheit von Kranwagen.** (2 600 Wörter & Abb.)

1933 **625 .143.2**
Glasers Annalen, Nr. 1338, 15. März, S. 48.
SPIES (R.). — **Schienen aus Verbundstahl** für Vollbahnen und Strassenbahnen. (3 300 Wörter & Abb.)

Organ für die Fortschritte des Eisenbahnwesens. (Berlin.)

1933 **621 .138 (.43) & 725 .33 (.43)**
Organ für die Fortschritte des Eisenbahnwesens, Heft 5, 1. März, S. 87.
PONTANI. — Das neue **Betriebswerk** Breslau-Dürrgoy. (8 200 mots & fig.)

1933 **625 .14 (01 (.439)**
Organ für die Fortschritte des Eisenbahnwesens, Heft 6, 15. März, S. 105.
NEMCSEK (J.). — Versuche der königlich- ungarischen Staatsbahnen über die **Standsicherheit des Gleises.** (7 500 Wörter & Abb.)

1933 **625 .143. (0 & 625 .143.4**
Organ für die Fortschritte des Eisenbahnwesens, Heft 6, 15. März, S. 115.
BÄSELER. — Der **Selbstspannoberbau.** Ein weiterer Schritt zum durchgehend geschweissten Gleis. (2 800 Wörter & Abb.)

1933 **625 .143.5**
Organ für die Fortschritte des Eisenbahnwesens, Heft 6, 15. März, S. 119.
BLOSS. — **Schienenbefestigung** durch Schweissen. (900 Wörter & Abb.)

1933 **625 .26 & 621 .138.5**
Organ für die Fortschritte des Eisenbahnwesens, Heft 6, 15. März, S. 121.
UEBELACKER. — Zur Frage der Erhöhung der **Laufleistung der Fahrzeuge** zwischen den Werkstätte-Untersuchungen. (3 800 Wörter & Abb.)

1933 **625 .2 (0**
Organ für die Fortschritte des Eisenbahnwesens, Heft 7/8, 1. April, S. 129.
LUTTEROTH (F.). — **Personenwagen.** (9 400 Wörter & Abb.)

1933 **625 .21**
Organ für die Fortschritte des Eisenbahnwesens, Heft 7/8, 1. April, S. 143.
BAUR (H.). — Spannungsuntersuchungen an **Personenwagenkästen.** (3 300 Wörter & Abb.)

1933 **625 .213**
Organ für die Fortschritte des Eisenbahnwesens, Heft 7/8, 1. April, S. 148.
SPEER (P.). — Die **Federn** der Personenwagen. (9 400 Wörter, 3 Tafeln & Abb.)

1933 **625 .23**
Organ für die Fortschritte des Eisenbahnwesen, Heft 7/8, 1. April, S. 161.
PUTZE (O.). — Versuche mit der **Heizung** der Personenwagen zur Feststellung ihres Wärmebedarfs und Wärmeverbrauchs. (6 500 Wörter, 7 Tafeln & Abb.)

Zeitschrift des Vereines Deutscher Ingenieur (Berlin.)

1933 **621 .11**
Zeitschr. des Ver. deutsch. Ing., Nr. 9, 4. März, S. 22
BERNER (O.). — Wasserumlauf und **Dampfkesselkonstruktion.** (7 800 Wörter & Abb.)

1933 **625 .13 (.73)**
Zeitschr. des Ver. deutsch. Ing., Nr. 10, 11. März, S. 26
SINGSTAD (O.). — Bau von **Unterwassertunnel** in den Vereinigten Staaten von Amerika. (4 200 Wörter & Abb.)

1933 **656 .211.5 (.431**
Zeitschr. des Ver. deutsch. Ing., Nr. 11, 18. März, S. 28
BERG (H.). — Der **Umsteigebahnhof** Schöneberg in Berlin. (1 800 Wörter & Abb.)

1933 **625 .2 (0 (.43**
Zeitschr. des Ver. deutsch. Ing., Nr. 13. 1. April, S. 33
WIENS (G.). — Neuerungen im **Personenwagenbau** der Deutschen Reichsbahn unter besonderer Berücksichtigung des Leichtbaues. (8 400 Wörter & Abb.)

1933 **62. (0**
Zeitschr. des Ver. deutsch. Ing., Nr. 14, 8. April, S. 37
RÖTSCHER (F.). — Die Ermittlung der **Spannungsverteilung** in Konstruktionsteilen durch Dehnungsmessungen. (4 800 Wörter & Abb.)

1933 **691 (.43**
Zeitschr. des Ver. deutsch. Ing., Nr. 15, 15. April, S. 38
LINDERMAYER (O.). — Arbeiten und Erfolge der Deutschen Reichsbahn auf dem Gebiete des **Korrosionsschutzes** durch Anstriche. (6 800 Wörter & Abb.)

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen.

1933 **656 .251 (.42**
Zeitschr. für das gesamte Eisenbahn-Sicherungswesen, Nr. 4, 10. März, S. 37.
GRADL. — Über das englische **Eisenbahn-Sicherungswesen.** Reiseeindrücke und Beobachtungen. (2 900 Wörter & Abb.)

Zeitschrift für das gesamte Eisenbahn-Sicherungswesen (Das Stellwerk) (Berlin)

1933 **656 .25**
Zeitschr. für das gesamte Eisenbahn-Sicherungswesen (Das Stellwerk.), Nr. 5, 10. April, S. 49.
APEL. — Über neue Einrichtungen zur **Überwachung der Fahrgeschwindigkeit.** (1 900 Wörter & Abb.)

1933 **656 .256**
·itsch. für das gesamte Eisenbahn-Sicherungswesen (Das Stellwerk.), Nr. 5, 10. April, S. 57.
WITTSCHELL. — **Blockstörung durch Kurzschluss** einer Lichtleitung. (800 Wörter & Abb.)

Zeitung des Vereins Mitteleuropäischer Eisenbahnverwaltungen. (Berlin.)

1933 **656 .212.5**
·itung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 9, 2. März, S. 181.
FRÖLICH. — **Betriebsuntersuchung** von Bahnhöfen. 500 Wörter & Abb.)

1933 **614 .5**
·itung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 10, 9. März, S. 201.
METZEL (K.). — **Schädlingsbekämpfung** im Bahn-·reiche. (3 300 Wörter.)

1933 **385 .587 & 656 .212 .9**
·itung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 10, 9. März, S. 205.
ENGELMAN und LANDWEHR. — **Fliessarbeit** bei ·n Güterabfertigungen. (4 400 Wörter & Abb.)

1933 **625 .162 (.43) & 656 .254 (.43)**
·itung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 11, 16. März, S. 227.
BUDDENBERG. — Die selbsttätige elektrische **·hrankenbeleuchtung.** (2 000 Wörter & Abb.)

1933 **656 .212.6 (.43)**
·itung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 12, 23 März, S. 245.
NOESSKE. — **Drehbare Ladebrücke** für den Leig-·rkehr. (800 Wörter & Abb.)

1933 **385 .517.7 (.436)**
·itung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 12, 23. März, S. 249.
KRAFT. — Die **Wohnungsfürsorge** der Österreichis-·en Bundesbahnen. (1 400 Wörter.)

1933 **351 (.43)**
·itung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 13, 30. März, S. 261.
CALMBERG. — Die Deutsche Reichsbahn-Gesell-·haft **in ihren Beziehungen zum bürgerlichen Recht.** ·000 Wörter & Abb.)

1933 **656 .213 (.43)**
·itung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 13, 30. März, S. 268.
MEYER. — Der vereinigte **Hafen- und Rangierbahn-·of.** Eine Studie unter Berücksichtigung Hamburger ·erhältnisse. (4 400 Wörter & Abb.)

1933 **621 .135.2 (.73) & 625 .212 (.73)**
·itung des Vereins mitteleurop. Eisenbahnverwalt., Nr. 15, 13. April, S. 301.
SCHWERING (F.). — **Hartgussräder** im nordameri-·nischen Eisenbahnbetrieb. (3 400 Wörter & Abb.) ·ortsetzung folgt.)

In English.

Bulletin, American Railway Engineering Association. (Chicago, Ill.)

1933 **625 .162 (.73) & 656 .254 (.73)**
Bull., Amer. Ry. Eng. Association, February, p. 647.
Report of Committee on **grade crossings : Laws and practices for determining division of cost of highway grade crossing separations. — Reflector units. — Specifications. — Railroad highway grade crossing signs.** — Specifications. — Etc. (5 400 words, tables & fig.)

1933 **725 .3 (.73)**
Bull., Amer. Ry. Eng. Association, February, p. 681.
Report of Committe on buildings : **Specifications for railway buildings. Electrically-operated freight or baggage elevators.** Modern methods of **heating small railway buildings,** showing comparative advantages of **warm air, hot water, steam and possibly fan-unit systems.** — Design and construction of **modern fruit and produce terminal buildings.** — Use of **materials other than brick, stone and cement** in exterior and interior walls, partitions, floors and ceilings of buildings. (5 400 words & fig.)

1933 **625 .143.3 (.73)**
Bull., Amer. Ry. Eng. Association, February, p. 705.
BALDRIDGE (C. W.). — A review of the **performance of steel rails** in American railways. (1 600 words & fig.)

Engineer. (London.)

1933 **624. (0 & 669 .1**
Engineer, No. 4024, February 24, p. 188.
A new **structural steel.** (2 600 words & fig.)

1933 **656 .285**
Engineer, No. 4024, February 24, p. 194.
Accidents to platelayers. (1 100 words.)

1933 **621 .132.5 (.51)**
Engineer, No. 4024, February 24, p. 200.
2-8-2 « Mikado » freight locomotive for China. (700 words & fig.)

1933 **625 .236 (.42)**
Engineer No. 4024, February 24, p. 201.
Railway carriage disinfecting plant. (300 words.)

1933 **385 .51 (.42)**
Engineer, No. 4026, March 10, p. 245.
Conciliation boards on the railways. (3 500 words.)

1933 **621 .392 (.42) & 625 .13 (.42)**
Engineer, No. 4026, March 10, p. 255.
London Midland & Scottish Railway **bridge reconstruction.** (600 words.)

1933 **621 .43**
Engineer, No. 4027, March 17, p. 276.
The **oil locomotive** again. (1 700 words.)

1933 **656 .281 (.42)**
Engineer, No. 4027, March 17, p. 280.
The Great Bridgeford fatal **derailment**. (1 000 words & fig.)

1933 **621 .132.5**
Engineer, No. 4027, March 17, p. 301.
Six-coupled locomotives. (1 300 words.)

1933 **621 .138.3 (.42)**
Engineer, No. 4029, March 31, p. 320.
Locomotive wheel drops, London Midland & Scottish Railway. (700 words & fig.)

1933 **385 (.42) & 656 .1 (.42)**
Engineer, No. 4029, March 31, p. 320.
Railways and the Nation. (2 400 words.)

1933 **51 (08**
Engineer, No. 4030, April 7, p. 346.
The log-log **slide rule.** (4 000 words & fig.)

Engineering. (London.)

1933 **621 .43**
Engineering, No. 3503, March 3, p. 265.
Operating results with Diesel locomotives and rail cars. (900 words.)

1933 **721 .36 (.82)**
Engineering, No. 3504, March 10, p. 267.
80 000-ton **granary** at Bahia Blanca. (3 000 words & fig.)

1933 **656 .222.1**
Engineering, No. 3504, March 10, p. 281.
The single-coach train. (2 300 words.)

1933 **621 .43**
Engineering, No. 3504, March 10, p. 287.
Combined water and oil cooler for Diesel locomotives. (300 words & fig.)

1933 **621 .335 (.439)**
Engineering, No. 3505, March 17, p. 296; No. 3507, March 31, p. 349.
The Kandó system of **electric traction** on the Hungarian State Railways. (6 500 words & fig.)

1933 **621 .43**
Engineering, No. 3505, March 17, p. 300.
HOFFERT (W. H.) und CLAXTON (G.). — Ease of **starting with benzole, with petrols and with benzole-petrol mixtures.** (5 200 words & tables.)

1933 **625 .4 (.44)**
Engineering, No. 3506, March 24, p. 319.
RICH (Th.). — The development of the **Paris Metropolitan Railway.** (1 700 words & fig.)

1933 **621 .335 (.82) & 621 .43 (.82)**
Engineering, No. 3506, March 24, p. 328.
Oil-electric units for the Buenos Ayres Great Southern Railway. (2 200 words & fig.)

Engineering News-Record. (New York.)

1933 **624 .1 & 721 .1**
Engineering News-Record, No. 8, February 23, p. 244.
HOUSEL (W. S.). — **Bearing power of clay** is determinable. (4 800 words & fig.)

1933 **656 .213 (.73**
Engineering News-Record, No. 10, March 9, p. 305.
NICHOLSON (G. F.) and EARLE (E. C.). — New **marine terminal** at Los Angeles. (2 300 words & fig.)

1933 **62. (01 & 69**
Engineering News-Record, No. 10, March 9, p. 322; No. 11, March 11, p. 350.
New facts about **cement and concrete.** (5 800 words & fig.)

1933 **62. (01 & 721 .1**
Engineering News-Record, No. 11, March 11, p. 345.
LYSE (I.). — **Reinforced brick columns** tested at Lehigh University. (600 words.)

1933 **69**
Engineering News-Record, No. 13, March 30, p. 401.
BURROWS (E. H.). — **Concrete strength increases by spray irrigation.** (1 100 words & fig.)

1933 **725 .3**
Engineering News-Record, No. 13, March 30, p. 403.
Architecture applied to **elevated steel tanks.** (1 80[illegible] words & fig.)

1933 **69**
Engineering News-Record, No. 13, March 30, p. 408.
DUFOUR (F. O.). — Increasing the capacity of **framed timber joints.** (1 200 words & fig.)

1933 **625 .143.1 (.73**
Engineering News-Record, No. 13, March 30, p. 412.
New rail section adopted by A. R. E. A. at Chicago. (850 words & fig.)

Journal, Institute of Transport. (London.)

1933 **65**
Journal, Institute of Transport, March, p. 278.
WOODS HUMPHERY (G. E.). — A review of air **transport.** (11 000 words.)

1933 **385 .58**
Journal, Institute of Transport, March, p. 294.
JENKIN JONES (C. M.). — Organisation of labour **operations at docks.** (6 700 words.)

1933 **385 (.44**
Journal, Institute of Transport, March, p. 303.
DUPUIS (M. D.). — **Difficult times for French railways.** — Causes and remedies. (11 000 words.)

1933 **656 .1 (.73**
Journal, Institute of Transport, March, p. 322.
United States **Road-Rail Committee.** (1 100 words

1933 656 .222.6
ournal, Institute of Transport, April, p. 331.
GRASETT (E. D.). — **Freight train operation.** 0 000 words.)

1933 656 .213
ournal, Institute of Transport, April, p. 345.
REED (H. A.). — **Cargo appliances at docks.** (6 500 ords.)

1933 656 .1 (.73) & 656 .2 (.73)
ournal, Institute of Transport, April, p. 355.
CAMPBELL (C. D.). — **American railways — motor mpetition and co-ordination.** (3 800 words.)

1933 385 (.44)
ournal, Institute of Transport, April, p. 361.
DUPUIS (M. D.). — **Difficult times for French railays.** Causes and remedies. (1 200 words.)

Journal, Institution of Engineers, Australia. (Sydney.)

1933 621 .392 & 625 .13
ournal, Institut. of Eng., Australia, January, p. 13.
COCKBURN (Q. R.). — **Electric arc welding as plied to railway bridges.** With particular reference the bridge over the Hunter River at Singleton, S. W. (5 000 words & 2 tables.)

1933 624. (0
ournal, Institut. of Eng., Australia, February, p. 60.
BALSILLE (G. D.). — **Concrete bridge slab decks.** 200 words & tables.)

The Locomotive. (London.)

1933 621 .33 (.44) & 621 .43 (.44)
e Locomotive, March 15, p. 70.
Oil-electric locomotive, P. L. M. (500 words & fig.)

1933 621 .132.3 (.43)
e Locomotive, March 15, p. 71.
New **high-pressure « Pacific » locomotive,** German ate Railways. (1 100 words & fig.)

1933 621 .43
e Locomotive, March 15, p. 73.
Rail transport with Diesel engines. (1 800 words fig.)

1933 621 .335 (.42) & 621 .43 (.42)
e Locomotive, March 15, p. 79.
Armstrong-Shell express, Euston-Castle Bromwhich **oil-electric rail-car,** L. M. & S. Ry. (800 words fig.)

1933 621 .132.1 (.52)
e Locomotive, March 15, p. 80.
Recent locomotives, Imperial Japanese Rys. (750 rds & fig.)

1933 621 .131.2
The Locomotive, March 15, p. 83.
PHILLIPSON (E. A.). — **Steam locomotive design : Data and formulæ.** (750 words & fig.)

1933 621 .133.7
The Locomotive, March 15, p. 87.
ATKINSON (T. G.). — **Feed-water heating** on locomotives. (2 500 words.)

1933 621 .43 (.42)
The Locomotive, March 15, p. 89.
150 H. P. Hunslet **Diesel locomotive.** (900 words & fig.)

1933 621 .43 (.42)
The Locomotive, March 15, p. 90.
300 H. P. **petrol locomotives,** Bermuda Ry. (900 words & fig.)

1933 621 .133.4
The Locomotive, March 15, p. 94.
A new **smoke eliminator for locomotives.** (400 words & fig.)

Mechanical Engineering. (New York.)

1933 625 .24
Mechanical Engineering, March, p. 151.
PECK (C. B.). — **Freight cars. Effect of transportation requirements on their evolution.** (4 200 words & fig.)

1933 621 .132 & 625 .23
Mechanical Engineering, March, p. 157.
BARBA (C. E.). — Future **design of passenger equipment.** (4 000 words & fig.)

1933 614 .7
Mechanical Engineering, March, p. 163.
RUSSELL (A. E.). — **Dust in industry.** (2 500 words & fig.)

1933 536
Mechanical Engineering, March, p. 172.
KEENAN (J. H.). — Recent steam research in Europe. (2 000 words & fig.)

1933 621 .43 (.43)
Mechanical Engineering, March, p. 191.
Streamlined high-speed car of the German National Railroad Company. (1 300 words & fig.)

1933 33
Mechanical Engineering, April, p. 211.
The balancing of economic forces. I. — An analysis of forty **causes of business instability.** (15 000 words.)

1933 614 .7
Mechanical Engineering, April, p. 229.
BLOOMFIELD (J. J.). — **Dust in industry.** (4 400 words & fig.)

1933 **536**
Mechanical Engineering, April, p. 243.
LONGWELL (H. E.). — **A thermodynamic theory for steam?** (3 400 words.)

Modern Transport. (London.)

1933 **621 .13, 621 .335 & 621 .43**
Modern Transport, No. 728, February 25, p. 2.
Steam, electric and oil-electric. (800 words.)

1933 **625 .258 (.42) & 656 .212.5 (.42)**
Modern Transport, No. 728, February 25, p. 3.
New down concentration yard at March. **Eddy current rail brakes on L. N. E. R.** (1 100 words & fig.)

1933 **621 .33 & 656 .222**
Modern Transport, No. 728, February 25, p. 7.
Electric trains for stopping services. Characteristics of equipment. (1 700 words.)

1933 **621 .338**
Modern Transport, No. 729, March 4, p. 4.
Electric rolling stock design for intense services. (1 300 words.)

1933 **336 .2 (.42) & 656 .1 (.42)**
Modern Transport, No. 729, March 4, p. 5.
Licensing and taxation of road transport. (2 600 words.)

1933 **656 .225 (.42)**
Modern Transport, No. 729, March 4, p. 6.
Container for meat traffic. (900 words & fig.)

1933 **336 .2 (.4) & 656 .1 (.4)**
Modern Transport, No. 729, March 4, p. 14.
DECHEVRENS (Ch.). — **Road transport on the Continent.** — No. 1. — **Restrictions in Switzerland.** (2 000 words.)

1933 **621 .133.1**
Modern Transport, No. 730, March 30, p. 3.
STRAUSS (F.). — **Economy in locomotive coal consumption.** (2 800 words.)

1933 **621 .132.8 (.56)**
Modern Transport, No. 730, March 30, p. 5.
Steam railcar services in Turkey. (800 words & fig.)

1933 **621 .132.8 (.82)**
Modern Transport, No. 730, March 30, p. 5.
Reciprocating condensing locomotive. Service tests in Argentina. (750 words & fig.)

1933 **656 .281 (01 (.42)**
Modern Transport, No. 730, March 30, p. 7.
Conflicting evidence in accident inquiry Great Bridgeford mishap. (2 800 words.)

1933 **621 .132.8 (.42)**
Modern Transport, No. 732, March 25, p. 3.
« **Sentinel-Cammell** » **rail-bus for Southern Ry.** (800 words & fig.)

1933 **385 (.42**
Modern Transport, No. 732, March 25, p. 4.
FENELON (K. G.). — **British railways since th** war. (1 700 words.)

1933 **625 .13 (.41**
Modern Transport, No. 732, March 25, p. 5.
An important **bridge reconstruction.** Boyne viadu (G. N. R.), Ireland. (1 500 words & fig.)

1933 **388 (.42**
Modern Transport, No. 733, April 1, p. 3.
Lord ASHFIELD. — **Passenger transport in Great London.** No. 1. — **Problem of adequate facilities.** (2 20 words & fig.)

1933 **651 & 65**
Modern Transport, No. 733, April 1, p. 5.
SUTHERLAND (G.). — **Accounting methods on Br tish Railways.** (1 500 words.)

1933 **656 .1 (.931) & 656 .2 (.931**
Modern Transport, No. 733, April 1, p. 7.
BUTCHER (Major H. F.). — **Co-ordination of ra and road services.** (850 words.)

1933 **656 (.42**
Modern Transport, No. 734, April 8, p. 5.
WOOD (W. V.). — Problem of **inland transpor** The **railway problem.** (1 400 words.)

1933 **388 (.42**
Modern Transport, No. 734, April 8, p. 6.
Lord ASHFIELD. — **Passenger transport in Great London.** No. 2. — **Traffic congestion** on the street (1 800 words.)

Proceedings, American Society of Civil Engineers (New York.)

1933 **693 & 721**
Proceed., Amer. Soc. of Civil Eng., March, p. 407.
HANSEN (J. H.). — Developments in **reinforc brick masonry.** (6 800 words & fig.)

Proceedings, Institution of Mechanical Engineers (London.)

1932 **621 .8 & 621**
Proceed., Institut. of Mech. Eng., November, p. 211.
TOWN (H. C.). Modern **hydraulic** operation of **m chine tools.** (35 000 words & fig.)

Railway Age. (Philadelphia.),

1933 **621 .33 (.7**
Railway Age, No. 8, February 25, p. 268.
Pennsylvania **electrification** links Philadelphia a New York City. (2 000 words & fig.)

1933 **656 .211 (.73)**
ailway Age, No. 8, February 25, p. 271.
New **passenger station facilities.** (1 300 words & fig.)

1933 **621 .335 (.73)**
ailway Age, No. 8, February 25, p. 273.
Locomotives develop 1 250 horse-power per axle Pennsylvania Railroad). (3 300 words & fig.)

1933 **621 .335 (.73) & 621 .338 (.73)**
ailway Age, No. 8, February 25, p. 277.
New car equipment permits use of trailers on same hedules (Pennsylvania Railroad). (1 000 words & g.)

1933 **621 .332 (.73)**
ailway Age, No. 8, February 25, p. 278.
Locating and erecting **catenary supporting structures** Pennsylvania Railroad). (3 300 words & fig.)

1933 **625 .111 (.73)**
ailway Age, No. 8, February 25, p. 281.
Roadway changes required by electrification. (2 200 ords & fig.)

1933 **621 .331 (.73) & 621 .332 (.73)**
ailway Age, No. 8, February 25, p. 284.
Transmission, substations and catenary system Pennsylvania Railroad). (3 500 words & fig.)

1933 **621 .331 (.73)**
ailway Age, No. 8, February 25, p. 291.
Power supply for electrification. (2 000 words & fig.)

1933 **621 .332 (.73)**
ailway Age, No. 8, February 25, p. 294.
Power supervision, switching and section alizing. Pennsylvania Railroad). (2 000 words & fig.)

1933 **656 .25 (.73)**
ailway Age, No. 8, February 25, p. 297.
Changes (due to electrification) in **interlockings and gnaling system.** (2 700 words & fig.)

1933 **627 (.73) & 656 .213 (.73)**
ailway Age, No. 8, February 25, p. 326.
New **ore dock** built entirely of **reinforced concrete.** 1 800 words & fig.)

1933 **625 .214 (.73)**
ailway Age, No. 8, February 25, p. 329.
Research improves performance of **journal bearings.** 1 800 words & fig.)

1933 **625 .162 (.73) & 656 .259 (.73)**
ailway Age, No. 8, February 25, p. 334.
ZANE (W. F.). — Burlington replaces **crossing gates** ith **flashing-light signals.** (1 200 words & fig.)

1933 **385 .1 (.73) & 385 .3 (.73)**
ailway Age, No. 9, March 4, p. 337.
Railroad reorganization bill passed by Congress. 2 500 words.)

1933 **385. (072 & 62. (01**
Railway Age, No. 9, March 4, p. 358.
Railroads profit from research. (2 800 words.)

1933 **621 .135.3 (.73)**
Railway Age, No. 9, March 4, p. 361.
Interlocking spring rigging developed on the Texas and Pacific. (700 words & fig.)

1933 **621 .335 (.73) & 621 .43 (.73)**
Railway Age, No. 9, March 4, p. 363.
CRATON (F. H.). — Operation of **three-power locomotives.** (2 200 words & fig.)

1933 **625 .253 (.73)**
Railway Age, No. 11, March 18, p. 390.
Accomplishments in **railway mechanical research.** (3 200 words & fig.)

1933 **385 .113 (.71 + .73)**
Railway Age, No. 11, March 18, p. 397.
Net deficit (Class I railways, U. S. A.), in 1932 was $ 153 308 487. (450 words & tables.)

1933 **625 .14 (06 (.73)**
Railway Age, No. 11, March 18, p. 410.
American Railway Engineering Association holds another convention at Chicago. **Abstracts of Proceedings** of the thirty-fourth annual convention held at the Palmer House, 14th and 15th March 1933. (23 000 words.)

1933 **725 .52 (.73)**
Railway Age, No. 12, March 25, p. 440.
New Union **inland freight station** opened at New York. (2 500 words & fig.)

1933 **624 (.73)**
Railway Age, No. 13, April 1, p. 468.
Unusual designs are used for **concrete bridges.** (3 200 words & fig.)

1933 **625 .234 (.73)**
Railway Age, No. 13, April 1, p. 470.
WALKER (A. R.). — **Air conditioning operating costs.** (1 700 words & fig.)

1933 **625 .245 (.73)**
Railway Age, No. 13, April 1, p. 472.
Pullman builds 70-ton hopper car with cast-steel underframe. (1 500 words & fig.)

1933 **656 .256.2 (.73)**
Railway Age, No. 13, April 1, p. 475.
Remote control switch replaces interlocker on Missouri Pacific. (850 words & fig.)

Railway Engineer. (London.)

1933 **625 .143.2 & 625 .143.3**
Railway Engineer, March, p. 68.
Steel rails and transverse fissures. (2 500 words.)

1933 621 .132.3 (.44)
Railway Engineer, March, p. 71.
Modern **French locomotive practice.** (1 500 words.)

1933 656 .222
Railway Engineer, March, p. 72.
Reversible steam train working. (500 words.)

1933 625 .13 (.460)
Railway Engineer, March, p. 73.
Reconstruction of a Spanish **railway bridge.** (800 words & fig.)

1933 385 .586 (.42)
Railway Engineer, March, p. 75.
LARKIN (E. J.). — The progressive system of **workshop training.** (3 000 words & fig.)

1933 621 .93 (.42)
Railway Engineer, March, p. 81.
Hancock **oxygen jet-cutting machines** for the London Midland & Scottish Ry. (1 000 words & fig.)

1933 621 .43 (.43)
Railway Engineer, March, p. 83.
FUCHS (F.) and BREUER (M.). — German **high speed motor coach** « der Fliegende Hamburger ». (3 500 words & fig.)

1933 621 .13, 621 .335 & 621 .43
Railway Engineer, April, p. 97.
Steam, electric or Diesel traction ? (1 000 words.)

1933 621 .135.3
Railway Engineer, April, p. 102.
SANDERS (T. H.). — The Asspi **spring steel** section. (2 400 words & fig.)

1933 621 .132.3 (.44)
Railway Engineer, April, p. 106.
New 4-8-2 French State locomotive. Further details and a description of the **Renaud poppet valve-gear.** (1 700 words & fig.)

1933 656 .254 (.42) & 656 .255 (.42)
Railway Engineer, April, p. 109.
Centralised traffic control, Stanmore branch, Metropolitan Railway. (2 800 words & fig.)

1933 621 .392 (.42) & 625. 13 (.42)
Railway Engineer, April, p. 114.
A bridge repair by arc welding. (700 words & fig.)

1933 625 .232
Railway Engineer, April, p. 115.
An **all-metal gangway connection** for **corridor coaches.** (250 words & fig.)

1933 621 .143.5
Railway Engineer, April, p. 116.
New type of **rail fastening for steel sleepers.** (1 400 words & fig.)

1933 669
Railway Engineer, April, p. 118.
Eliminating metallic corrosion. (1 400 words.)

1933 621 .9 (.42
Railway Engineer, April, p. 120.
Precision forging machine. (550 words & fig.)

1933 621 .95 (.42
Railway Engineer, April, p. 121.
A new **railway shop machine tool.** (500 words & fig

1933 625 .172 (.44) & 625 .245 (.44
Railway Engineer, April, p. 122.
New French **track testing car.** (1 200 words & fig

Railway Engineering and Maintenance. (Chicago.)

1933 625 .144.4 & 625 .
Railway Engineering and Maintenance, March, p. 12
How far have we come ? An analytical study of th factors that influenced the **application of power too** (2 800 words & fig.)

1933 625 .144.4 & 625 .
Railway Engineering and Maintenance, March, p. 12
What of the future ? An analysis of **probable tren in equipment** and its use. (6 900 words & fig.)

1933 625 .144.4 & 625 .
Railway Engineering and Maintenance, March, p. 1
Machines or hand labor ? (3 000 words & fig.)

1933 625 .144.4 & 625 .
Railway Engineering and Maintenance, March, p. 14
KNOWLES (C. R.). — Making **work equipme** work. (3 900 words & fig.)

Railway Gazette. (London.)

1933 625 .258 (.42) & 656 .212.5 (.4
Railway Gazette, No. 8, February 24, p. 245.
New down **marshalling yard** at March, L. N. E. (1 200 words & fig.)

1933 621 .338 (.49
Railway Gazette, No. 8, February 24, p. 249.
New **rolling-stock** for the Visp-Zermatt Railwa Switzerland. (1 300 words & fig.)

1933 621 .
Supplement to the Railway Gazette, February 24, p.
REED (B.). — **Diesel traction** in extra-Europe countries. (2 400 words & fig.)

1933 625 .2
Supplement to the Railway Gazette, February 24, p.
DARLING (C. S.). — Clarkson **waste-head boiler** **Diesel rolling-stock.** (2 300 words & fig.)

1933 621 .335 (.73) & 621 .43 (.7
Supplement to the Railway Gazette, February 24, p.
RATCLIFFE (T.). — **Diesel-electric-battery locomo**tive. (1 200 words & fig.)

1933 621 .43 (.48
Supplement to the Railway Gazette, February 24, p.
Diesel rail traction in Denmark. (450 words & fi

1933 **621 .43 (.73)**
ıpplement to the Railway Gazette, February 24, p. 12.
American **pneumatic-tyred Diesel railcar.** (300 words fig.)

1933 **621 .43**
ıpplement to the Railway Gazette, February 24, p. 14.
MIALL (S.). — **Transmission for Diesel locomotives** ıd **railcars.** (1 400 words & fig.)

1933 **621 .43**
ıpplement to the Railway Gazette, February 24, p. 15.
Deutz **geared Diesel locomotive.** (1 000 words & fig.)

1933 **621 .43 (.42)**
ıpplement to the Railway Gazette, February 24, p. 17.
Two British **rail traction Diesels.** (1 700 words & fig.)

1933 **621 .33 (.42) & 621 .43 (.42)**
ıpplement to the Railway Gazette, February 24, p. 20.
Armstrong-Shell **Diesel-electric express.** (700 words fig.)

1933 **625 .258 (.42) & 656 .212.5 (.42)**
ailway Gazette, No. 9, March 3, p. 288.
Whitemoor (March) **marshalling yards,** L. N. E. R. 00 words & fig.)

1933 **621 .135.1 (.931)**
ailway Gazette, No. 9, March 3, p. 289.
Bar frames for locomotives. (400 words & fig.)

1933 **621 .132.8 (.42)**
ailway Gazette, No. 9, March 3, p. 290.
Recently built « Sentinel-Cammell » **steam railcars.** 1 200 words & fig.)

1933 **621 .98 (.42)**
ailway Gazette, No. 9, March 3, p. 293.
A new **machine tool for railway shops.** (900 words fig.)

1933 **656 .255 (.42)**
ailway Gazette, No. 11, March 17, p. 379.
Centralised traffic control. New Stanmore branch, etropolitan Railway. (3 000 words & fig.)

1933 **621 .132.6 (.44)**
ailway Gazette, No. 11, March 17, p. 383.
Remarkable 2-8-2 **tank locomotive** for the Nord. 200 words & fig.)

1933 **625 .13 (.42)**
ailway Gazette, No. 11, March 17, p. 387.
Rapid bridge reconstruction on the London Midland Scottish Railway. (1 300 words & fig.)

1933 **621 .132.8 (.42)**
ailway Gazette, No. 12, March 24, p. 421.
New Sentinel **rail-bus** for Southern Railway. (350 ords & fig.)

1933 **621 .43**
Supplement to the Railway Gazette, No. 12, March 24, p. 3.
Diesel rail traction operating results. — I. **Railcars.** (1 400 words & tables.)

1933 **621 .43 (.439)**
Supplement to the Railway Gazette, No. 12, March 24, p. 4.
ZAKARIÁS (A.). — **Diesel mechanical railcars** in Hungary. — I. (1 300 words & fig.)

1933 **621 .335 (.47) & 621 .43 (.47)**
Supplement to the Railway Gazette, No. 12, March 24, p. 7.
Diesel-electric locomotive for Russia. (300 words & fig.)

1933 **621 .335 (.44) & 621 .43 (.44)**
Supplement to the Railway Gazette, No. 12, March 24, p. 8.
Diesel-electric shunting locomotive for France. (600 words & fig.)

1933 **621 .43**
Supplement to the Railway Gazette, No. 12, March 24, p. 9.
Novel **Diesel railcar.** (300 words & fig.)

1933 **621 .43**
Supplement to the Railway Gazette, No. 12, March 24, p. 10.
Transmissions for Diesel locomotives and railcars. (1 200 words & fig.)

1933 **621 .335. (.43) & 621 .43 (.43)**
Supplement to the Railway Gazette, No. 12, March 24, p. 12.
HEDLEY (R.). — Latest Eva Maybach **Diesel-electric railcar.** (1 000 words & fig.)

1933 **621 .43 (.42)**
Supplement to the Railway Gazette, No. 12, March 24, p. 14.
Hibberd-Planet **Diesel locomotive.** (500 words & fig.)

1933 **621 .13, 621 .33 & 621 .43**
Supplement to the Railway Gazette, No. 12, March 24, p. 15.
Steam, Diesel or electric traction. (1 000 words.)

1933 **621 .43 (.43)**
Supplement to the Railway Gazette, No. 12, March 24, p. 16.
Diesel traction developments on the German Reichsbahn. (500 words & fig.)

1933 **621 .43**
Supplement to the Railway Gazette, No. 12, March 24, p. 17.
PUDNEY (F. A.). — Notes on **three Diesel locomotive types.** (2 200 words & fig.)

1933 621 .43 (.4)
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Notable **Diesel traction developments.** Large Continental railcar orders. (900 words & fig.)

1933 651 & 652
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Mechanical methods applied to **railway accountancy and statistics.** — A brief summary of a thoroughly comprehensive treatise upon **mechanical accountancy** in **its various forms.** — Part I : General considerations. (1 500 words & fig.)

1933 621 .132.5 (.54)
Railway Gazette, No. 13, March 31, p. 451.
New **2-8-2 type locomotives** for H. E. H. the Nizam's State Railways. (900 words.)

1933 625 .144.4 (.42) & 625 .172 (.42)
Railway Gazette, No. 13, March 31, p. 454.
An ingenious **ballast cleaner.** (700 words & fig.)

1933 651 & 652
Railway Gazette, No. 14, April 7, p. 478.
Mechanical methods applied to railway accountancy and statistics. — Part II. (2 500 words & fig.)

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L. M. S. Ry. **road motor maintenance and cartage operations.** (1 700 words & fig.)

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Footplate of 2-8-2 locomotive for H. E. H. the Nizam's State Railways. (1 fig.)

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1933 385. (09.1 (.92)
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Railway Mechanical Engineer. (Philadelphia.)

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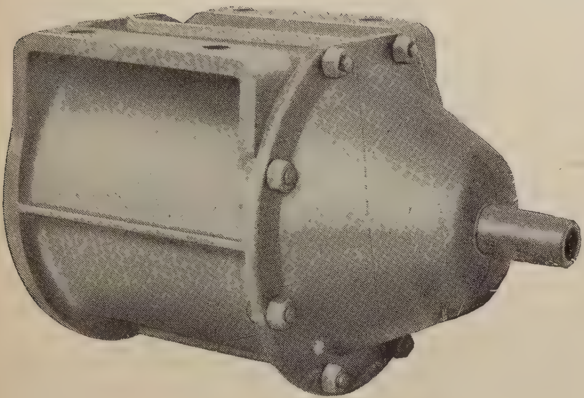

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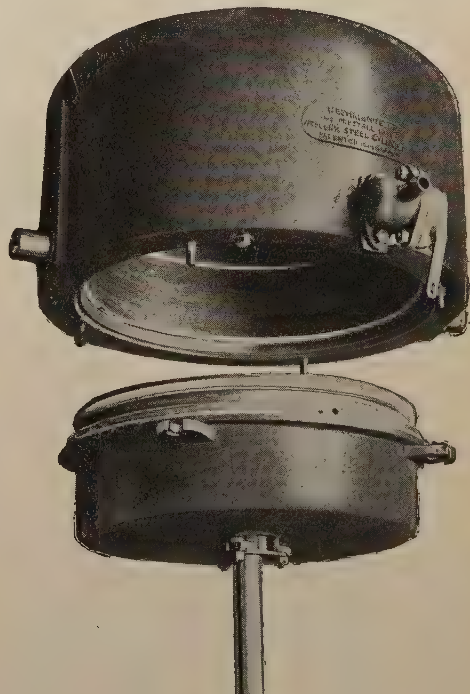

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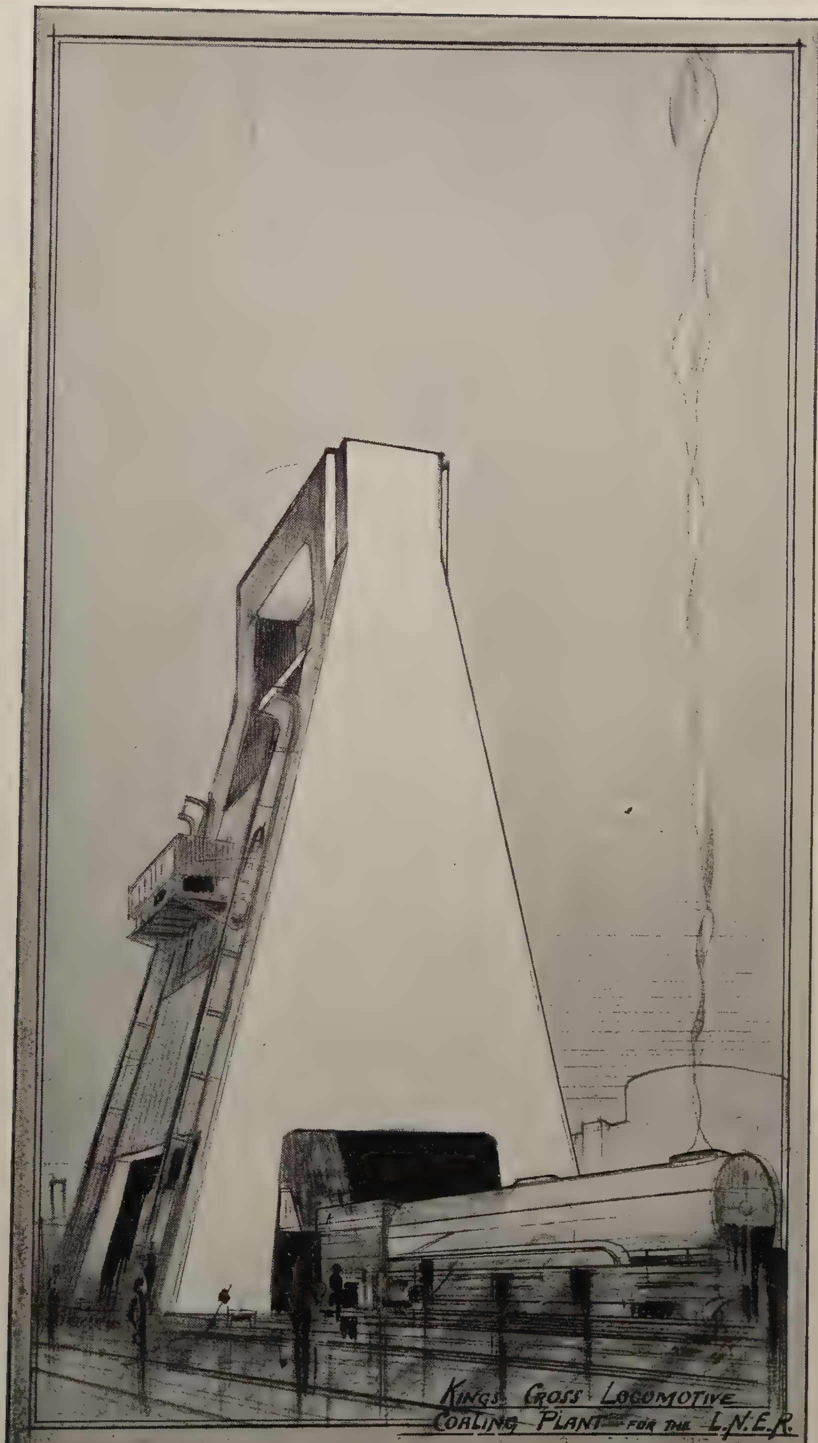
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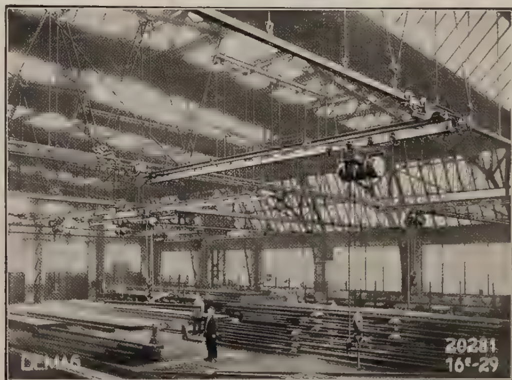

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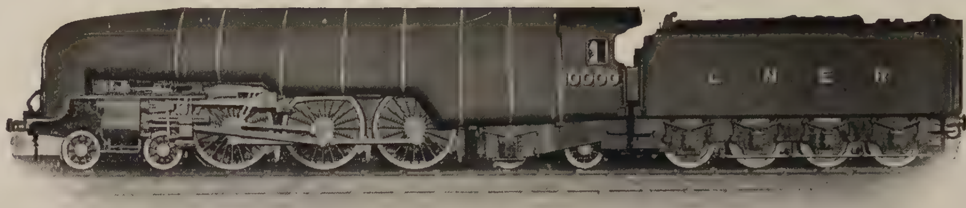

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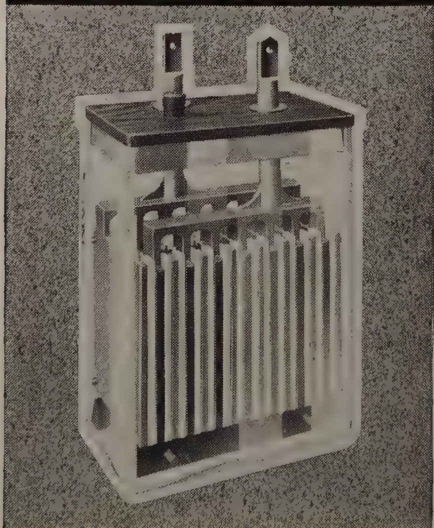

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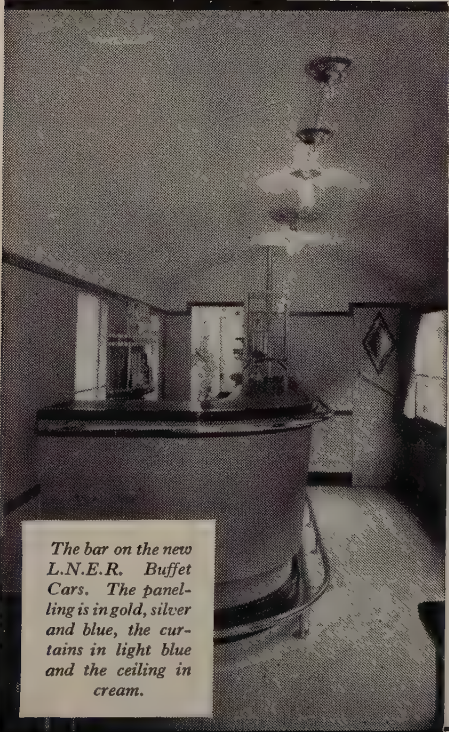

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